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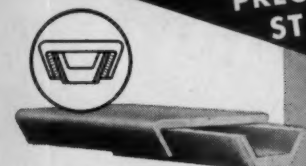

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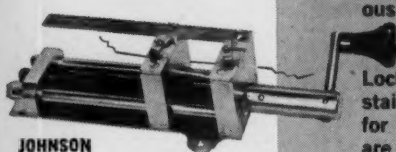

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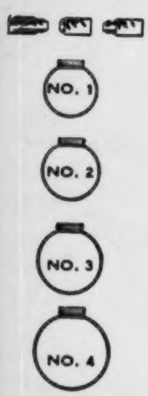

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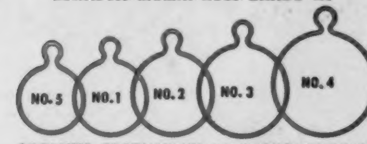

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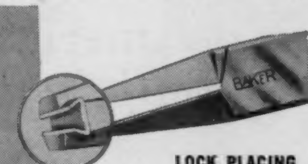

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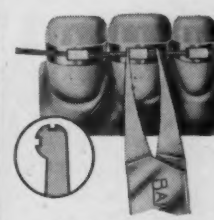

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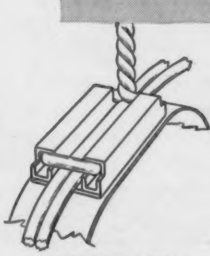

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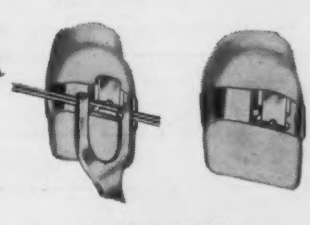

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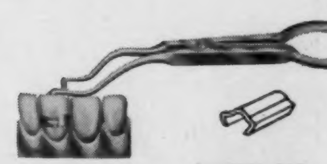

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CONTENTS FOR AUGUST, 1958

American Journal of Orthodontics

(Editorial and Business Communications on inside back cover)

An Atlas of Basic Concepts in Diagnosis, Treatment and Prognosis

Orban-Wentz-Everett-Grant
PERIODONTICS
A Concept—Theory and Practice

Integrating theory and practice, PERIODONTICS A Concept—Theory and Practice is a new, atlas-type presentation of the basic biological concepts in periodontics and the clinical application of them. Edited by Dr. Balint Orban with 3 co-editors and written by 22 eminent clinicians and teachers, this new book skillfully guides you from the diagnosis to the treatment and prognosis.

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By BALINT ORBAN, M.D., D.D.S., Loyola University School of Dentistry, Chicago, Illinois. Editorial Staff: FRANK M. WENTZ, M.S., Ph.D., D.D.S., Loyola University School of Dentistry, Chicago, Illinois; FRANK G. EVERETT, M.S., D.M.D., M.D., University of Oregon Dental School, Portland, Oregon; and DANIEL A. GRANT, D.D.S., University of Southern California School of Dentistry, Los Angeles, California, with 22 Contributors.

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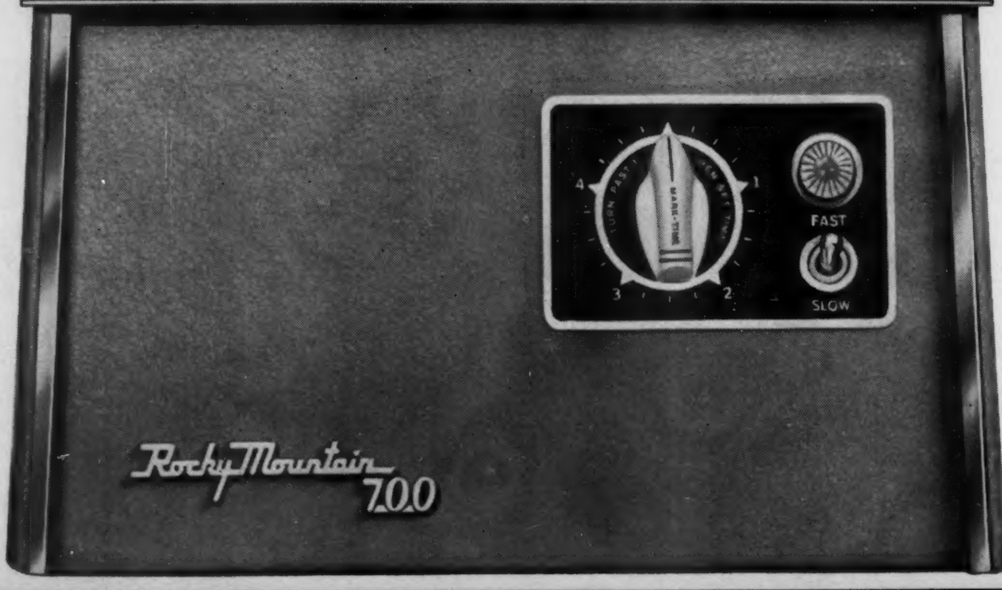
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The American Board of Orthodontics, officers of the American Association of Orthodontists, and recipients of the 1958 Albert H. Ketcham Memorial Awards, following presentation of the Ketcham Awards to Joseph D. Eby and H. C. Pollock at the Commodore Hotel in New York City.

Standing (left to right): B. F. Dewell (A.B.O.), L. Bodine Higley (A.B.O.), Wendell L. Wylie (A.B.O.), J. A. Salzmann (A.B.O.), Frank Bowyer (A.B.O.), and Charles R. Baker (chairman of Golden Anniversary Luncheon).

Seated (left to right): William R. Humphrey (A.B.O.), Joseph D. Eby (recipient of Ketcham Award), Lowrie J. Porter (chairman of American Board of Orthodontics), H. C. Pollock (recipient of Ketcham Award), and Frank Squires (president, 1958, of American Association of Orthodontists).

American Journal of ORTHODONTICS

VOL. 44 AUGUST, 1958 No. 8

Original Articles

DENTAL DEVELOPMENT AND THE CHILD AS A WHOLE

BYRON O. HUGHES, PH.D., ANN ARBOR, MICH.

THE evidence on growing children that has been collected at the University School of the University of Michigan for the past twenty-seven years has now accumulated to the point where we can say with assurance that the child grows as a highly individualized and extensively interdependent whole. Furthermore, it may be stated that a child grows in a lawful, orderly, and predictive way within himself, irrespective of how much his individual growth pattern may or may not conform to that of another child or group of children.

When we use a multidiscipline, longitudinal approach to the problems of growth, the implications of the statement that the child is a highly individualized and extensively interdependent whole become much more impressive and meaningful than the conclusions that we can develop by studying only one part at a time. To illustrate this, one may point out that orthodontists have been much interested in bone growth and, therefore, should study bone; but bone growth and muscle growth have an unbreakable and exceedingly close and continuous correlation, and muscle growth and muscle use are of necessity interdependent. Then we cannot continue unless we recognize that muscle use and behavior are, again, continuously and inseparably associated. Dr. Shehan has shown me one of his cases in which the kind of necessary association outlined above went into action to produce a developing Class III malocculsion.

From the University of Michigan.

Presented before the Great Lakes Society of Orthodontists, Detroit, Michigan, Oct. 20-23, 1957.

Here an aggressive emotional state was brought into action by muscles to become a mandibular thrusting habit, which finally became stabilized as a developing Class III malocclusion through the adaptability of bone and the locking action of the primary teeth in cross-bite relation.

Further illustration of the individuality of growth is given by the growth figures of five of our University School children. These figures are constructed by using thirty-six measures of growth: three from the intelligence area; eight from the school achievement field; two from the growing skeleton; seventeen from the dentition; and one each from height, weight, strength of grip, behavior, personality structure, and social maturity. Each of these figures is computed in the same manner by generalizing all of the measures into density bands in such a way that the heavy line in the center is the least squares fit of the equation, $Y = AX^{n+1} + C$, to the arithmetic means of the several measures listed above. These means are taken on both the vertical axis (ordinate) and the horizontal axis (abscissa) at one-year and half-year intervals. The central line so obtained has been termed the organismic age, and it is a much better statement of how old the child is at any given time than is his chronological age. The dense band distributed on either side of the mean is obtained by a least squares fit of the above equation to the roots of the variances, computed on both axes, at one-year and half-year intervals. The area obtained by this method is called the organismic area, since it represents the central two-thirds of the child's total growth pattern. Furthermore, the computation shows the extent to which the child is growing in a unified or in a diversified way: the narrower the band, the greater is the uniformity of all growing items; the broader the band, the lesser is the interrelatedness of growth.

These two growth trajectories—the organismic age and the organismic area—may serve as a reference system for particular growth values that we may wish especially to emphasize. These figures present two particular lines of interest in the field of orthodontics—bone growth and dental growth. The measures used to develop the bone growth line are obtained from readings taken in the elbow, the wrist and hand, and the mandible. (Let me say here that a much better bone growth line for orthodontic purposes would be one using measures taken primarily from the craniofacial complex. However, our present data do not permit the more desirable presentation. A serial cephalometric x-ray program was added to our research when Dr. Moyers came to the University, and in another five or six years we shall be able to add these data in giving further interpretation to the individuality of growth.) The line showing dental development is computed from measures on the growth of each permanent tooth, using an appraisal system developed by Drs. Lewis Pinney and Carmen Nolla, and in addition, using measures of the clinical eruption sequence of the permanent teeth. This latter line has excellent technical precision and appears satisfactory for the professional purpose of orthodontics.

In brief review, the figures present a generalization of the total growth with a heavy central line, called organismic age, to show how old the child is in terms of growth age rather than chronological age. Then the extent to which the

child is growing in a unified or diversified fashion is presented by a shaded area, labeled the organismic area. For the special interest purposes of orthodontics, two growth areas—bone and dentition—are shown. Finally, the average growth of children is presented as the straight diagonal line which traverses the figure at a 45 degree angle between the growth-age and the chronologic-age axes.

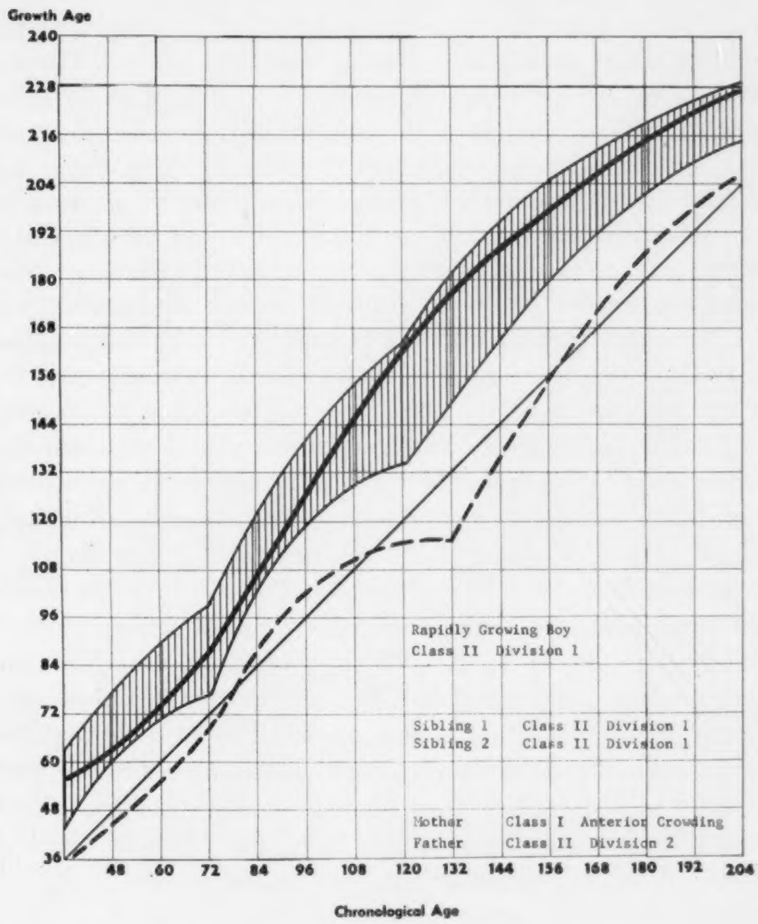

Fig. 1.

The boy whose growth is shown in Fig. 1 may be classified as a rapidly growing boy, since the organismic age exceeds the chronologic age at all times and since the rate of growth is faster than the average rate. The general growth is strongly rhythmic, with three major periods shown. The first extends from 36 to 72 months of age; the second from 72 to 120 months; and the third, from 120 to 204 months of age. It may be noted further that the rate of growth shows marked change during each cycle, with the beginning accelerated and the end retarded. As we follow the organismic area, we note that the width of the area is nearly twice as great at 120 months of age as it is at 36 months and at 204 months. In other words, the unity of growth within

this boy is significantly reduced during the period of the mixed dentition, and in this case it appears to be a contributory etiological factor to the developing malocclusion. As we follow the line showing the growth of bone, we see that this growing area is a centrally developing phenomenon, since it lies within the organismic area at all times. In strong contrast, however, is the pattern of growth of the whole child and the growth of bone; the former presents three cycles, whereas bone shows the termination of one at 54 months of age and then shows a second which begins at 54 months and continues to adulthood. Finally, it will be observed that bone growth is at the bottom of the organismic area until 90 months, at which time it moves rapidly upward to 120 months; from then until adulthood, it lies at the top of the area. The line presenting dental growth and eruption is conspicuously different from the line showing bone growth and from the details showing the organismic age and area. Of particular importance is the fact that within this boy the growth and eruption of the dentition are markedly retarded throughout development. This fact becomes clear when we see that at 11 years of chronologic age the dentition is 9½ years old, the organism as a whole is 14 years old, and bone is developed to the 15-year level! Observe, however, that, according to the growth of the dentition of all children in general, this boy is growing in a "normal" way, neither retarded nor accelerated. The unfolding occlusal relationships in this boy are consistent with the graphic portrayal of his growth. The bone growth in the skull and face is rapid and closely timed with the growth of bone in the wrist and elbow areas. The mandible—a bone which is peculiar in both its growth and its evolution—is slow growing relative to the other areas of the skeleton. In this case the mandibular development closely parallels the growth and eruption of the teeth. The net effect of this "within child" difference is to produce a characteristic Class II, Division 2, malocclusion which is present in the primary dentition and becomes extenuated through the mixed dentition stages when the differential growth rate is most heavily emphasized. That this growth pattern rather than other etiological factors, is responsible for the malocclusion seems apparent in this case. Furthermore, when we follow the growth and/or occlusal relations in other members of the family, we are forced to suspect, if not to conclude, that heredity is largely responsible for the way in which this child grew. We note that the father shows the same kind of skeletal pattern and malocclusion that the boy presents. The mother's facial and mandibular pattern is Class II toward Division 1, although malocclusion is Class I with marked anterior crowding above and below. The two male siblings present Class II, Division 1 malocclusion with a skeletal pattern that resembles the mother more than the father. This boy was treated orthodontically by what some call "comprehensive methods," which seems to mean non-use of extraction and deferring the treatment until all permanent teeth except the third molars are established in occlusion. The boy's age was 14 years 2 months. At this time the mandible was making a favorable adjustment to the upper face. The appliance used was the Angle-edgewise, the response was reasonably rapid

with correction completed in nineteen months. Seven years later the case was reviewed and the results were to be described as excellent and stable. In summary, it appears to me that the orthodontist who treated this boy made proper use of the evidence by recognizing that the main source of the malrelation was differential growth due to heredity and by avoiding treatment until the growth pattern was more consistent with his treatment plan.

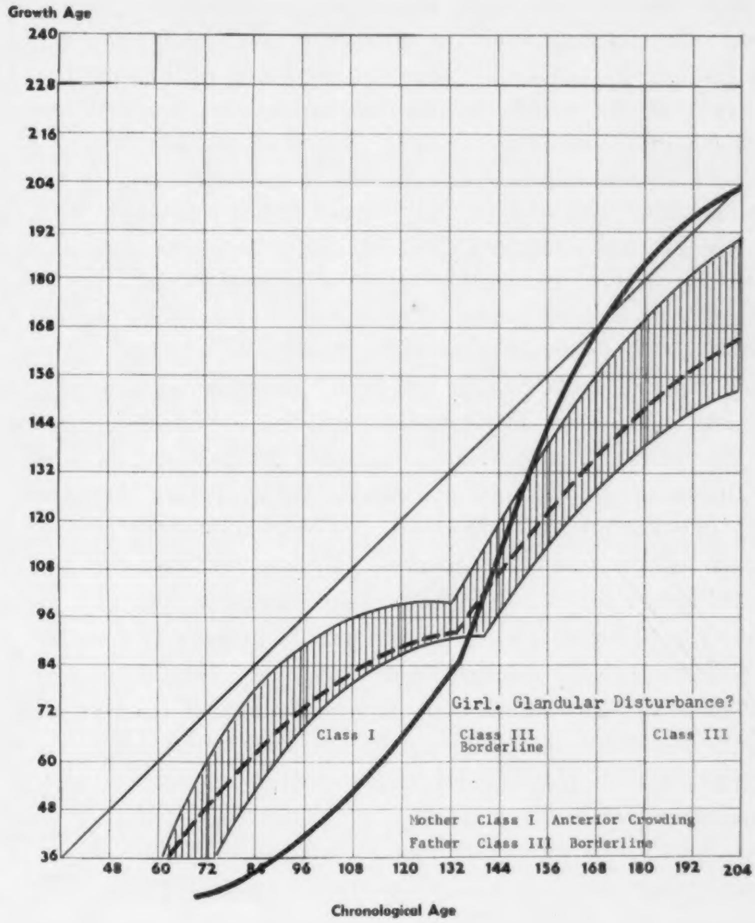

Fig. 2.

The growth pattern of a girl is shown in Fig. 2. This is a very unusual growth picture, and as yet we have been unable to provide a very satisfactory answer to the question: "Why did this girl grow this way?" Symptomatically, this first appeared to be caused by a glandular disturbance, and the girl was described medically as being hypopituitary and hypothyroid. In view of this diagnosis, pituitary and thyroid treatment was instituted at 97 months of age and continued until 123 months. The response to this treatment was unfavorable and produced no measurable change in the growth, except perhaps to slow it down and to increase the internal discrepancies. Several changes in behavior

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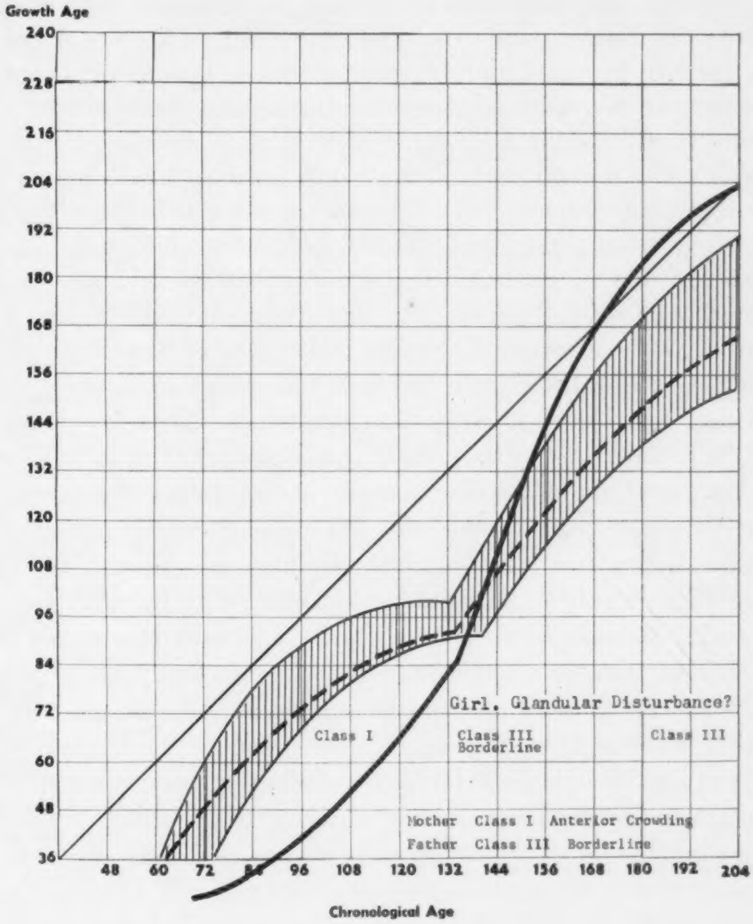

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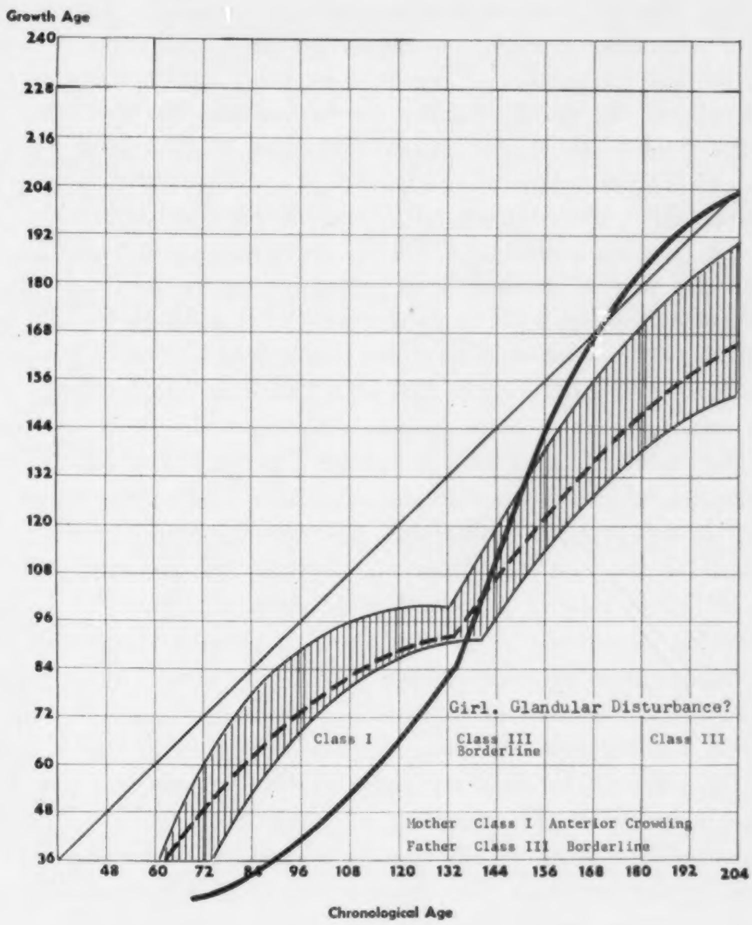

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were produced; among them, several convulsive reactions to the treatment. A year after this treatment, the growth became rapid. I believe that this was not a delayed response to the therapy but, rather, that it is to be ascribed partially to the fact that the organism was relieved from heavy and disturbing interference. Further evidence indicates that this pattern of growth is hereditary and that, no matter how peculiar it may seem, it could easily be a picture of normal growth for an unusual person. The fact is that both parents are small and were late in attaining physiologic adulthood. The mother was unusually late; she did not reach the menarche until 16.5 years of age. Both parents, the mother in particular, present evidence of having devoted little energy to growth at the epiphyseal centers throughout the skeleton, and each parent has the type of skull and upper face that is associated with a short basicranial axis. The mandible of the mother is consistent with her upper face. The father's mandible, although actually small, is not consistent with the upper face, so that his face has a marked Class III appearance, although the occlusion is borderline. By way of general description, it may be said that the mother of this girl presents a skeletal pattern suggestive of chondrodystrophic dwarfism, which is primarily a phenomenon of heredity rather than of glandular disturbance, and the father looks as if his growth had been "stunted" in a somewhat similar fashion. At any rate, there is more than enough evidence in the parents to suggest that the pattern of growth in the girl is a normal expression of her genes and not a symptom of glandular disturbance. As we follow the figure, we note that the girl is subaverage throughout the developmental period, that the general pattern shows two very marked rhythms of growth, and that the internal variability is subject to considerable change as the girl matures (24 months at age 72, 10 months at age 132, and 36 months at age 204 months). The growth and eruption of the dentition follow very closely the growth of the whole child, while the growth of bone is heavily out of context with general growth, showing heavy deficiency during the first cycle and marked excess during the second growth cycle. In the early phase of development, the girl presents a Class I malocclusion with the maxillary anterior teeth being crowded. This condition remained stable until 135 months of age and then began to change so that the maxillary crowding disappeared and Class III relationships developed, although not far enough to force anterior cross-bite relationship. Here again the development of occlusion follows a hereditary pattern indicated by the occlusal relationships of the parents. The mother has a Class I malocclusion in a Class III skeletal pattern (midface deficiency), and the father has a Class III malocclusion with a Class III face (mandibular overgrowth and thrust), while the girl begins with midface deficiency, reduces this somewhat, and finally develops a Class III malocclusion that is a combination of midface deficiency and mandibular excess. This case was not treated, although it was recommended to the parents on several occasions. It was believed that the proper time to have instituted treatment was around 15 years of age when the permanent teeth, except the third molars, were stabilized in occlusion with the roots fully

developed. At the present time the patient is 27 years old and the occlusal picture is heavily complicated by secondary adaptations to the developmental process as outlined.

The growth of the boy represented in Fig. 3 is again an unusual picture, since it tends to be normal or average in the statistical sense. Here we note that the growth pattern is generally linear throughout, with only a suggestion of growth rhythms. The internal variability is low, and all growing items are closely coordinated during development. Included in this pattern are the

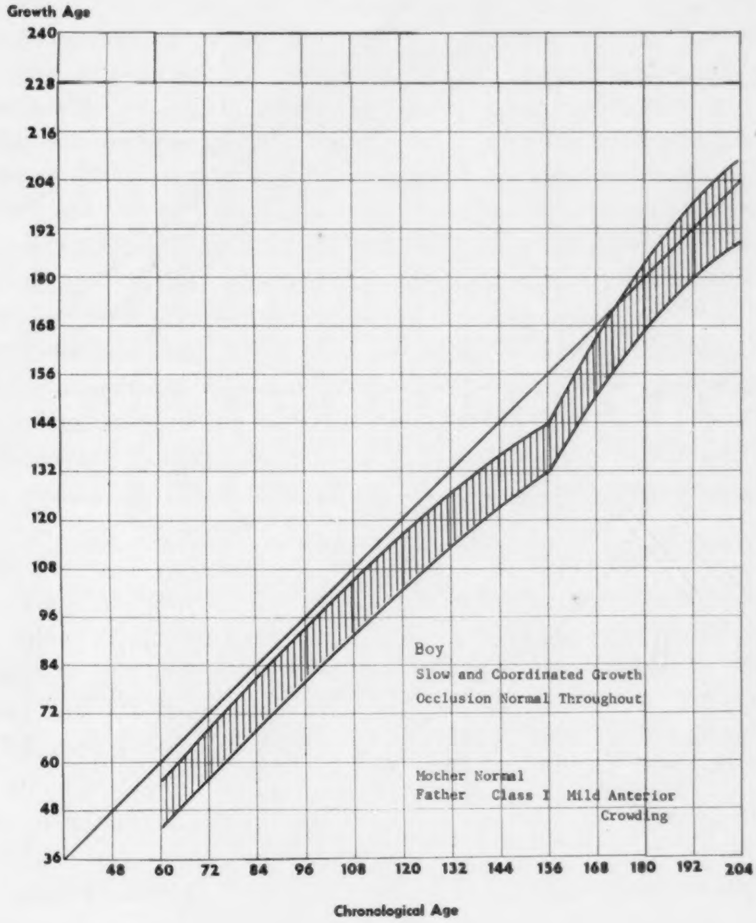


Fig. 3.

developmental lines for bone which at all times lie central to the individual and in close approximation to each other. The development of occlusion is in keeping with the rest of growth and is normal throughout. An interesting fact is that both parents show a balance between skeletal and occlusal factors, with the mother having normal relations and the father presenting a Class I malocclusion technically but an orthodontically insignificant mild anterior crowding.

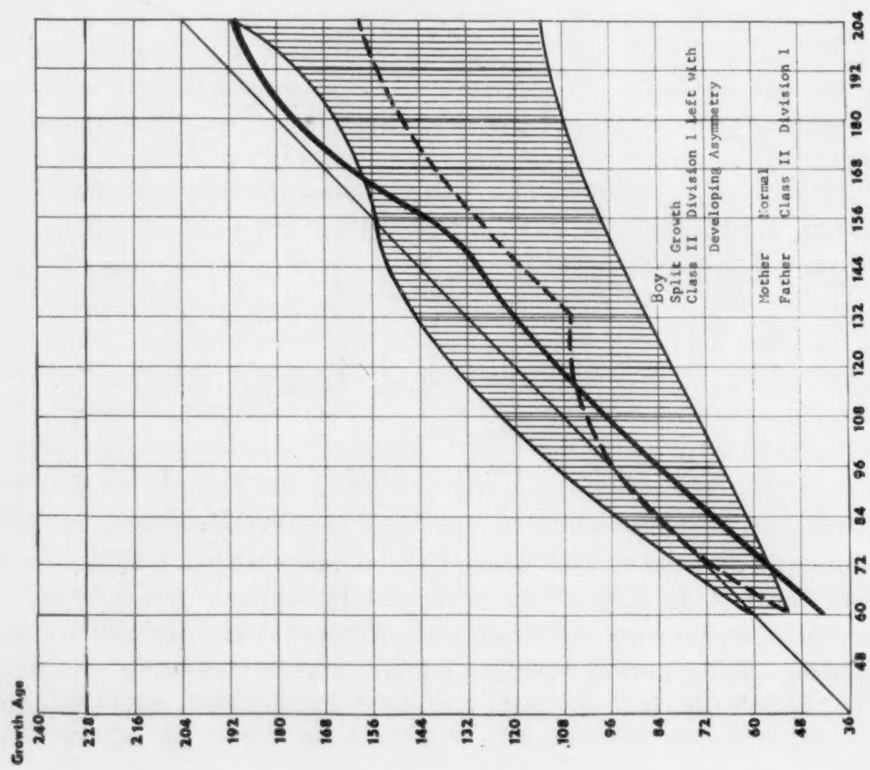

Growth Age
Chronological Age
Boy
Split Growth
Class II Division 1 Left with
Developing Asymmetry
Mother Normal
Father Class II Division 1

Fig. 4.

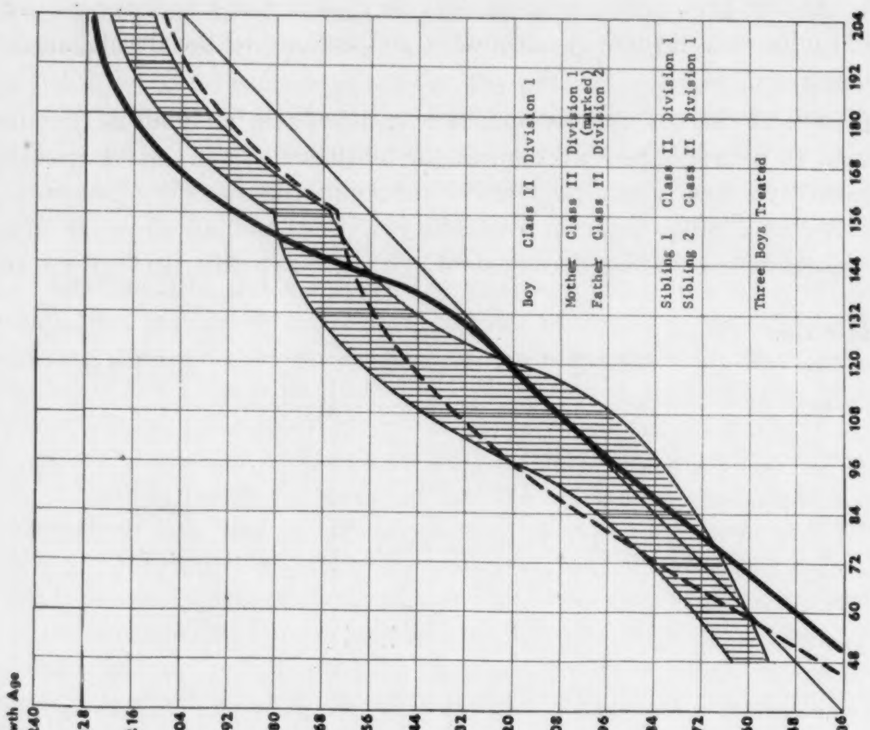

Growth Age
Chronological Age
Boy Class II Division 1
Mother Class II Division 1 (marked)
Father Class II Division 2
Sibling 1 Class II Division 1
Sibling 2 Class II Division 1
Three Boys Treated

Fig. 5.

The boy whose growth is illustrated by Fig. 4 has been labeled a "split-grower," since few of the measures used to construct the graph show much correlation with each other. The result is very marked "within variability," so that the child grows more like a population of children than he does like an individual child. This lack of balance and interrelationship during growth expresses itself in many ways. There is a high production of structural disharmonies and asymmetries; functional balances are low, often leading to diagnoses of glandular imbalances, functional dyscrasias, poor dietary adjustments, and low resistance to disease; there always seems to be something wrong, but response to specific forms of treatment tends to be limited. In the behavioral areas these children are often described as self-maladjusting and seem always in need of mental hygiene. In education, too, they create problems, and we find them needing special doses of reading, writing, arithmetic, and spelling in order to meet the standards of education. Malocclusions are usually found with these "split-growing" children, and in our population we have no split-growers who do not present malocclusions sufficiently severe to warrant correction. Especially noticeable among these children is the development of irregular and asymmetrical types of occlusion with peculiar cross-bites and types of crowding predominating and complicating the case. Most of these irregularities are based in the skeleton rather than in the teeth, with the irregularities of the teeth being secondary adaptations to the asymmetrical and nonharmonious relations of the supporting structures. The boy in Fig. 4 presents an early excess of tooth structure over bone and begins his development as a Class II, Division 1 case. By 96 months of age the permanent teeth in occlusion were $\frac{6\ 21 \mid 12\ 6}{6\ 21 \mid 12\ 6}$, with the $\frac{6 \mid 6}{6 \mid 6}$ in Class II relation, the $\underline{21 \mid 12}$ crowded, and the midline of the lower central incisor shifted to the left by about one-half the width of the lower central incisor. From 96 to 133 months of age, no additions were made in the eruption of permanent teeth. During this time the bone continued to grow and the asymmetry to the left became marked, due to a much faster rate of growth on the right half of the mandible than on the left, especially at the condyle, which both rotated and tipped the facial skeleton to the left. The next teeth to erupt were $\frac{5\ 4\ 3 \mid }{5\ 4\ 3 \mid 4\ 5}$; then 21 months later $\frac{\mid 3\ 4\ 5}{\mid 3}$ erupted and $\frac{7 \mid 7}{7 \mid 7}$ were added. The whole eruptive process was slow, and the 28 teeth were not established in occlusion until 17 years of age, a delay over average eruption of about three and one-half years. Early treatment, beginning at 8½ years of age, instituted with very poor response, so that it was discontinued at 10½ years of age with complete relapse. The case was treated again at 17½ years of age, using extraction to adjust the dentition to the irregularities of the face, with the compromise treatment giving good functional results which are still stable after ten years.

Fig. 5 shows the total growth pattern of a boy with a severe Class II, Division 1 malocclusion. Here we note a strong rhythmic pattern of growth

with three periods of strong change in rate. Especially noticeable is the strong contrast in the growth lines for teeth and bone, with the teeth growing and erupting ahead of bone from 48 to 144 months of age, then with bone growth crossing tooth growth and being more rapid for the terminal period. The malocclusion is consistent with the growth picture. The early erupting teeth have an indequate amount of supporting bone with the deficiency much heavier in the maxillary area than in the mandibular area. The result is that the anterior part of the maxillary arch is thrust forward, the teeth are crowded, and the arch is markedly narrowed. The mandibular teeth are also forced forward, but not as much, giving a Class II relationship. When the $\frac{6 \mid 6}{6 \mid 6}$ come into occlusion, this condition is locked and further development either continues or gives added emphasis. Both parents of this boy present Class II malocclusions; the father's is a Division 2, while the mother's is a marked Division 1 type. In view of the parental malocclusions, it would be predicted that children born to this mating would, with high probability, have marked Class II, Division 1 malocclusions. This is verified when we note that the two sibs, both boys, also developed the same type of malocclusion. The three boys were orthodontically treated, using premolar extraction to give a better balance between teeth and the supporting bone. Treatment was initiated after $\frac{7 \mid 7}{7 \mid 7}$ were established in occlusion. For all three boys the response was both good and rapid, and after a minimum of eight years the results are stable with excellent promise that they will remain so for some time. Especially striking in these three boys is the remarkable similarity of the growth patterns, the development of occlusal relations, and the favorable response to treatment.

So far, five developmental histories have been reviewed briefly for your consideration. The total growth picture has been presented, and the general lines showing the growth of bone and the growth of teeth have been emphasized to show their relationship to each other and their positions in the growth pattern of the whole child. Four of these children needed orothodontic treatment, and three received it.

In each case the individuality of growth has been shown through the use of a multidiscipline longitudinal approach to the problem. Finally, when we see the parts of particular interest placed more relevantly to the "whole" organism, we are in a better position to understand growth and, hence, to contribute more effectively to the management, solution, and guidance of particular problems.

A STUDY OF OCCLUSAL EQUILIBRATION AS IT RELATES TO ORTHODONTICS

Dayton G. Blume, D.D.S., M.S.D., Kansas City, Mo.

INTRODUCTION AND REVIEW OF LITERATURE

THE functional approach to the many-faceted problem of occlusion is a relatively recent one. According to Graber,[1] "The development of the idea of occlusion can be traced through fiction, hypothesis and fact." Graber states also that, along with the trend toward the factual approach, "There is another trend in the development of the concept of occlusion—the trend from the static to the dynamic. Original concepts of occlusion were those of a completed act—literally an anatomic approach, a description of how the teeth met when the teeth are closed. With more emphasis on physiology, and recognition of functional disorders, a much broader interpretation of occlusion has developed."

Three positions of the mandible are generally agreed upon: the physiologic rest position, the occlusal position, and the centric position. The physiologic rest position is controlled by the musculature and is the position from which all movements are initiated. The occlusal position is that position in which the teeth are in full contact. The centric position is that position in which not only are the teeth in full contact, but the condyles of the mandible are in a balanced position in the fossae. Graber[1] states: "When the positions of the teeth are anatomically and functionally correct, when muscular control is normal, and when there is no temporomandibular joint pathology, the occlusal position should coincide with the centric position."

The occlusal position of the mandible is extremely susceptible to local interferences, such as missing teeth and premature contacts. Lazarus[2] defines a prematurity as "any part of the tooth that will interfere with the natural movement of the condyle" and a prematurity in centric as "any part of the tooth that will interfere with the return of the condyles to the glenoid fossa." He states further: "Skid occurs when the position created by the prematurity cannot be retained; the mandible ricochets into a series of destructive movements culminating in functional bite."

That lack of local interference is of utmost importance in restoring the proper centric position of the mandible is further emphasized by Lauritzen,[3]

This thesis, which was given as a partial fulfillment of the requirements for certification by the American Board of Orthodontics, is being published with the consent and the recommendation of the Board, but it should be understood that it does not necessarily represent or express the opinion of the Board.

who states: "Occlusal disharmonies and other functional disturbances of the bite should be recognized and diagnosed routinely in order to institute a treatment producing a well-functioning bite." He outlines three methods by which a harmonious relation of the teeth and jaws may be obtained: (1) orthodontic measures, (2) restorative dentistry and prosthetic measures, and (3) incisal and occlusal selective grinding. He states also: "These methods are not sharply defined but often overlap." Madsen[4] also says, in effect, that premature contacts causing an "acquired centric" are frequent causes of failure in many cases of restorative dentistry.

Several methods designed to locate and remove these occlusal disharmonies or prematurities accurately have been outlined in the literature. Lazarus[2] describes a method whereby prematurities in centric show up as perforations in a wax bite. These areas are then marked on the teeth and carefully removed by precision grinding. Lateral and protrusive disharmonies are then located with marking paper or ribbon and similarly removed according to definite rules. Lauritzen[3] advises mounting accurate casts on an adjustable articulator and then eliminating undesirable relationships according to certain fundamental laws of articulation. Both of these methods, along with other similar techniques, are but variations in approach to the same problem. All advocate cautious, conservative precision grinding.

That occlusal disharmonies may be of importance in orthodontics is evidenced by the following statement by Lazarus: "A case (orthodontic) will be resolved much more quickly if the practitioner eliminates 'reverse orthodontics,' i.e., prematurities, which have even greater force than artificial orthodontic appliances."

That Madsen is also of this opinion is evidenced by his statement: "They (functional interferences) should be corrected before orthodontic patients are dismissed and before any great amount of operative work or extensive restorative and periodontal service is attempted."

The desirability of equalizing occlusal stresses is given further impetus by Thompson and Craddock[5] who state: "In orthodontics, the functional concept includes the idea of masticatory efficiency and periodontal integrity as well as evenly arranged teeth and good looks. Orthodontists are no longer satisfied with a beautiful face in the presence of a locked occlusion which is not only inefficient in mastication, but may lead in later years to periodontal destruction, temporomandibular joint dysfunction, or other pathologic changes."

Above and beyond the effect that occlusal disharmonies might have on retention, one must consider their possible effect on the periodontal structures. Periodontists generally agree that occlusal prematurities are a very definite etiological factor in many periodontal conditions. Rothner[6] states: "The orthodontist will align the teeth and bring into contact their morsal surfaces to the extent that each individual case will allow. Having thus aligned the teeth, is his work really finished? It is true that a better occlusal relationship will exist, but this relationship must be a harmonious one, one in which there is no evidence of those factors which in the years to come would give origin to periodontal

diseases.'' He states further: ''The failure of many [orthodontic] cases because of the presence of occlusal trauma can be avoided. This trauma will cause teeth to loosen or drift, the drifting being produced by a horizontal force against an inclined plane."

From the foregoing, it would seem that a functional analysis of any occlusion would require that careful consideration be given to the possibility of occlusal disharmony. Would this not be particularly true in an "orthodontic occlusion" where teeth have been moved and new inclined plane relationships established? Much has been accomplished in the field of occlusal equilibration, not only in the refined techniques advanced for accomplishing this end but also in the functional benefits to be derived therefrom. Realizing the importance of occlusal equilibration to the entire dental mechanism, it is felt that further study of these principles as applied to the completed orthodontic case would be of interest.

STATEMENT OF THE PROBLEM

In view of the trend toward functional analysis of occlusion and the increased belief that an orthodontic case is not necessarily completed when appliances are removed, it was felt that a study which would point out the need or lack of need of occlusal balancing in orthodontic cases at the completion of appliance therapy would be of value.

The primary objective was to demonstrate the presence or absence of occlusal prematurities in centric relation. It was felt that these prematurities, if present, would probably vary in magnitude and in the effects therefrom. From the foregoing, several questions naturally arose. "How important are these prematurities?" "How much bearing could they have on retention?"

It was with such questions as these in mind that this clinical study was undertaken.

MATERIALS AND METHODS

The subjects used in this study were ten patients who had previously undergone orthodontic treatment and who are now in various stages of retention.

Study models were made for each subject.

A "power bite" or wax bite, as described by Lazarus,[2] was taken for each subject. Aluwax forms with cloth were used for this purpose. The wax was softened slightly in warm water, placed in the subject's mouth, and pressed against the occlusal surfaces and incisal edges of the maxillary teeth. The subject was next instructed to move his upper jaw forward and was then allowed to bite just enough to indent the wax with the mandibular teeth. The wax was then removed and trimmed to a width just slightly greater than the buccal teeth. Plain Aluwax was then puddled where the last occluding mandibular teeth struck the wax; it was chilled and replaced in the mouth and, the patient was instructed to bite as before. The operator's thumb and forefinger were placed between the occlusal surfaces of the teeth on each side and the subject was instructed to bite on them. As he did so the fingers were eased out of the way, and the most posterior occluding mandibular teeth were forced into the wax.

This procedure caused the subject to anticipate power and thus to retrude the mandible as far as possible. This process was then repeated in the anterior region and again in the premolar region. The wax form was then replaced in the mouth in contact with the maxillary teeth, and the subject was instructed to close as before. The subject was allowed to close to the point of initial contact or until a tooth or teeth came into contact. The cloth in the wax form prevented the mandible from sliding at this point. The wax form was then removed. The point of initial contact showed up as a thin perforated area in the wax.

The study models of each subject were then occluded according to the wax bite and mounted with plaster on a grooved metal plate called an "analyzer." The wax was then removed and the occlusal prematurity, if present, was clearly seen. Thus, any discrepancy between the centric position of the mandible and the occlusal position could be demonstrated.

RESULTS

Case 212.—This case was originally a Class I (Angle) malocclusion with an arch length problem. Treatment involved the removal of four permanent teeth, as may be seen by the posttreatment study models (Fig. 1).

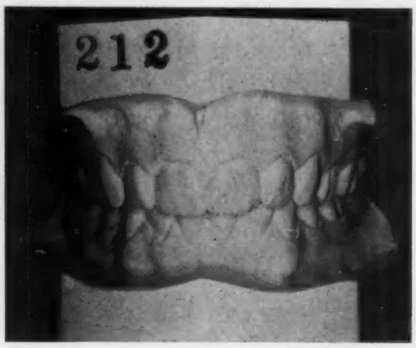


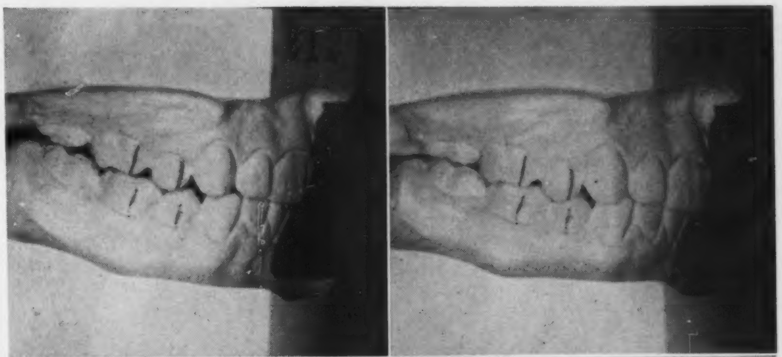
Fig. 1.—Case 212. Study models.

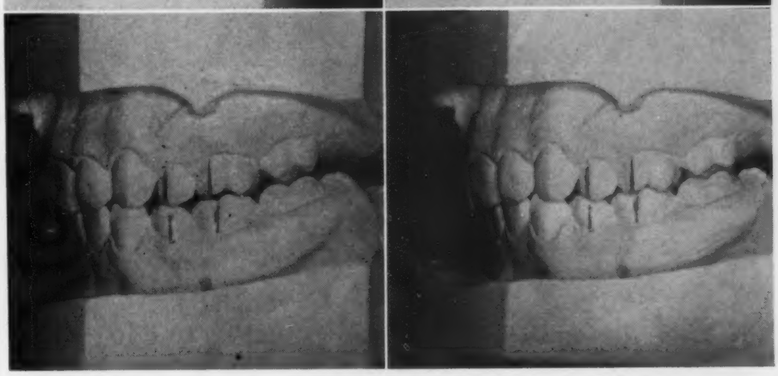
The wax bite would seem to indicate prematurities in the left incisor and left second molar regions. When the study models are mounted on the "analyzer," it may be seen that these teeth do contact first. The extent to which this interference manifests itself may also be seen (Figs. 2 and 3).

Case 277.—This case was originally a Class II, Division 1 (Angle) malocclusion. It was treated with distal movement of the maxillary teeth as the primary objective. The final result is indicated by the posttreatment study models (Fig. 4).

The wax bite indicates prematurities in both second molar areas, and when the study models are mounted on the "analyzer" this is made more apparent. The extent to which the occlusal prematurities interfere with the normal closing movement may be seen (Figs. 5 and 6).

A. Fig. 2. B.





A. Fig. 3. B.

Fig. 2.—Case 212. Mounted (*A*) and unmounted (*B*) models, right side.
Fig. 3.—Case 212. Mounted (*A*) and unmounted (*B*) models, left side.

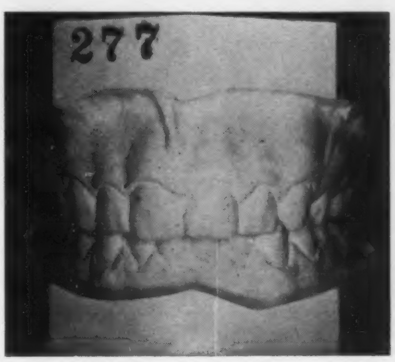
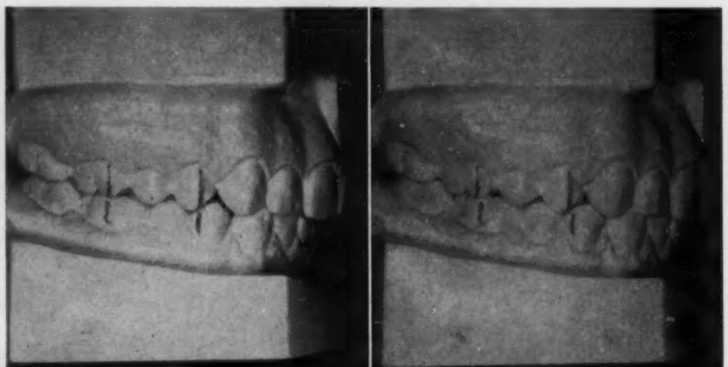
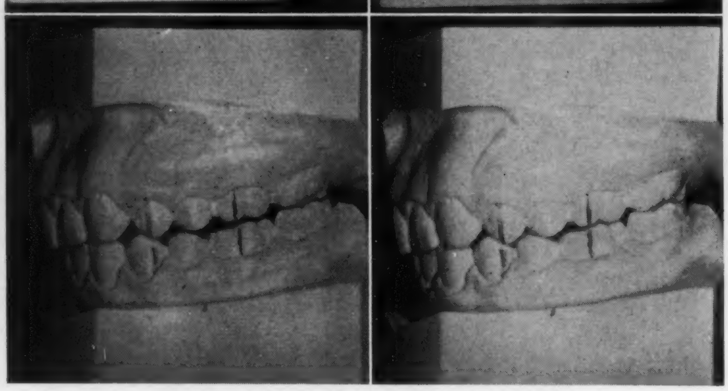


Fig. 4.—Case 277. Study models.

Case 262.—This case was originally a Class II, Division 1 (Angle) malocclusion in which treatment was accomplished without resorting to the removal of teeth. The final result is indicated by the posttreatment study models (Fig. 7).

A. Fig. 5. *B.*





A. Fig. 6. *B.*

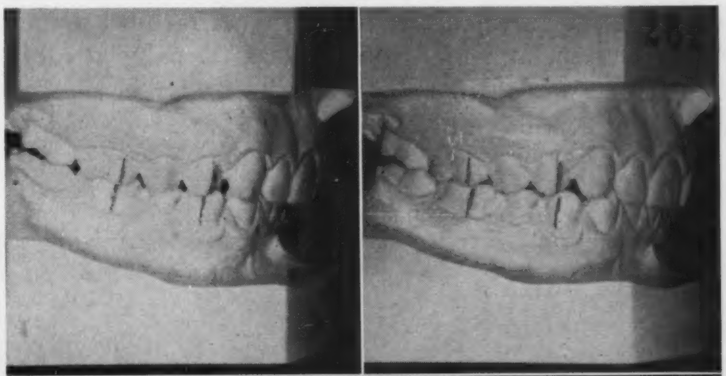
Fig. 5.—Case 277. Mounted (*A*) and unmounted (*B*) models, right side.
Fig. 6.—Case 277. Mounted (*A*) and unmounted (*B*) models, left side.

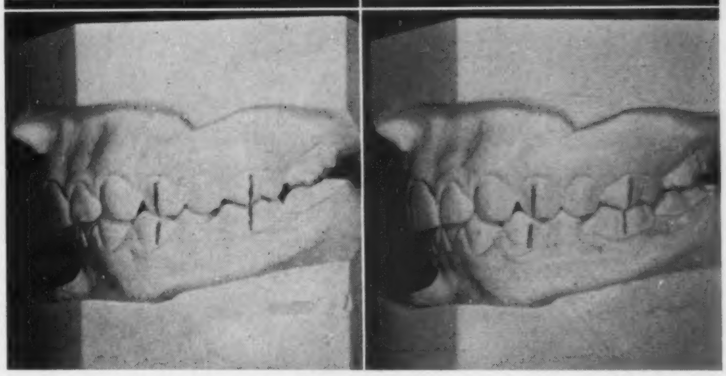
Fig. 7.—Case 262. Study models.

The wax power bite exhibits a relatively uniform pattern; that is, no one or two teeth seem to contact prematurely, to any great extent at least. When mounted on the "analyzer" in this relationship, the study models confirm this. It is seen that there is very little difference in occlusal relationships between the mounted and the unmounted occluded study models (Figs. 8 and 9).

Case 246.—This case was a Class I (Angle) malocclusion, treatment of which involved the removal of all four first premolars. The final result may be seen in the posttreatment study models (Fig. 10).

A. Fig. 8. B.





A. Fig. 9. B.

Fig. 8.—Case 262. Mounted (*A*) and unmounted (*B*) models, right side.
Fig. 9.—Case 262. Mounted (*A*) and unmounted (*B*) models, left side.

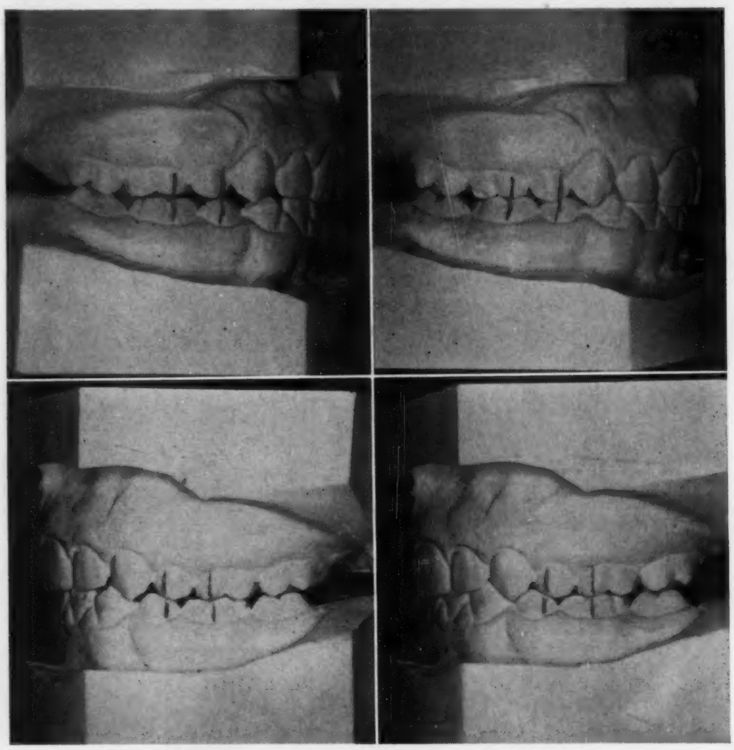
Fig. 10.—Case 246. Study models.

The wax bite indicates several prematurities in the second molar regions. When the study models are mounted on the "analyzer," it may be seen that a slight shift of the mandible is required to bring the teeth into full contact (Figs. 11 and 12).

Case 340.—This case was originally a Class I (Angle) malocclusion, the treatment of which involved removal of the maxillary and mandibular right first premolars.

The wax power bite indicates a premature contact in the left first molar region. When the study models are mounted on the "analyzer," according to this wax bite, it may be seen that the distolingual inclined plane of the distal cusp of the lower first molar actually does contact the mesiobuccal inclined plane of the distolingual cusp of the maxillary left first molar just before the remaining teeth contact. The same situation exists, but to a lesser degree, in the right first molar region.

A. Fig. 11. *B.*



A. Fig. 12. *B.*

Fig. 11.—Case 246. Mounted (*A*) and unmounted (*B*) models, right side.
Fig. 12.—Case 246. Mounted (*A*) and unmounted (*B*) models, left side.

Case 241.—This case was a Class II, Division 1 (Angle) malocclusion in which maxillary right and left first premolars were removed prior to treatment.

When the study models are mounted on the "analyzer," according to the wax power bite, it becomes apparent that there are prematurities which do not permit complete contact of all teeth without a slight forward shift of the mandible.

Case 312.—This was originally a Class II, Division 1 (Angle) malocclusion is which the maxillary right and left first premolars were removed as a part of treatment.

The wax power bite indicates prematurities in both second molar areas. When the models are mounted on the "analyzer" in this relationship, it is seen that complete contact of all teeth is not achieved without a forward shift of the mandible.

Case 121.—This case was originally a Class I (Angle) malocclusion, treatment of which involved removal of all four first premolars.

When the models are mounted on the "analyzer" in the relationship dictated by the wax bite, it may be seen that there are prematurities which interfere with complete contact of the teeth as seen in the unmounted study models.

Case 222.—This case was originally a Class I (Angle) malocclusion in which all four first premolars were removed prior to orthodontic treatment.

The power bite in this case indicates a relatively even contact of the teeth, with a slight prematurity in the right first molar region. When the study models are mounted on the "analyzer," it is seen that this prematurity is, indeed, slight and does not interfere with occlusion to any great extent.

Case 219.—This case was originally a Class I (Angle) malocclusion in which the four first premolars were removed prior to treatment.

The wax power bite indicates a prematurity in the right premolar region. When mounted on the "analyzer" in this relationship, the study models show the extent to which this prematurity interferes with occlusion.

DISCUSSION OF DATA

Of the ten cases used in this study, eight exhibit premature occlusal contacts of sufficient magnitude to be easily discernible when examined as previously described. Of the two remaining cases, one exhibits a slight prematurity whereas the other is clinically free of premature contacts.

Prematurities were found in every type of case examined, whether it was originally a Class I or a Class II malocclusion. There also appeared to be no correlation between the presence or absence of prematurities and the removal or nonremoval of teeth as a part of treatment.

It is realized that variables, such as method of treatment and degree of perfection achieved in treatment, do exist. The cases utilized in this study were not selected because they were thought to be outstanding orthodontic results. On the contrary, the idea was to select a cross section of cases showing varying results. Some were felt to be acceptable, whereas others left something to be desired. The occurrence of discrepancies in making records and gathering data is also a possibility in a clinical study of this type. This was kept constantly in mind during the actual process of assembling the material used, and utmost care was taken to keep the margin of error to a minimum.

Realizing the presence of variables as outlined above, it is still felt that, even in the limited number of cases used in this study, the preponderance of occlusal prematurities is sufficient to stimulate further interest as to their significance. If, as is suggested by this study, these prematurities do exist in a large number of finished orthodontic cases, is it not reasonable to assume that they

may be partially responsible for some of the stability problems that most orthodontists encounter? It seems logical to assume that any force of sufficient magnitude to cause the mandible to be deflected in its attempt to reach centric relation might very well be of sufficient magnitude to move a tooth or teeth and thereby alter the orthodontic occlusion that has been established. Retention, being the problem that it is, warrants every attention that can be given to it. Equilibration would seem to be one more step in the right direction, one more step toward a more perfect orthodontic result. It would seem that routine occlusal equilibration of completed orthodontic cases would be of value, if for no other reason than to establish the absence of prematurities.

Lateral and protrusive mandibular movements were not examined in this study as to the presence or absence of occlusal imbalance, and it would appear that such a study would be of value. From the functional, dynamic standpoint, occlusal imbalance during these movements could be just as important as those occurring in centric relation, if not more so.

The degree of influence that occlusal prematurities might have on the retentive qualities of a completed orthodontic case would be a very difficult thing to measure. It must suffice, for the present, to assume that if occlusal imbalance does exist, it is a phenomenon potentially capable of disturbing occlusal relationships.

SUMMARY AND CONCLUSIONS

1. Occlusal prematurities were found to exist in the majority of the completed orthodontic cases examined. The magnitude of these prematurities varied considerably.

2. No correlation was found between the type of malocclusion or method of treatment and the presence or absence of occlusal prematurities.

3. The actual effect of occlusal prematurities on the retentive qualities of completed orthodontic cases would be difficult to measure quantitatively, but logical reasoning would indicate a definite influence.

4. Although lateral and protrusive mandibular movements were not studied, it is felt that, in view of the results described herein, such a study would be of value.

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425 EAST 63RD ST.

THE ANALYSIS OF FACIAL GROWTH

II. The Horizontal and Vertical Dimensions

James H. Scott, Belfast, Ireland

INTRODUCTION

IN A PREVIOUS article[1] a method for the analysis of facial growth in the anteroposterior and vertical dimension as shown in lateral cephalograms was described. Here it is proposed to describe a method for the analysis of frontal cephalograms with special reference to growth in facial width.

CONSTRUCTION OF THE FRONTAL RECTANGLE

The primary base line is the frontozygomatic plane (Figs. 1 and 2). This is drawn between the outer edges of the frontozygomatic sutures on each side of the face.

From the two ends of the frontozygomatic plane two parallel lines are drawn, each at right angles to the frontozygomatic base line. These are the left and right lateral orbital planes.

At the level of the lower border of the mandible (chin) a fourth plane is drawn parallel to the frontozygomatic plane. This completes the frontal facial rectangle and is the mental plane.

The frontal facial rectangle is divided into an upper and a lower part by the inferior nasal plane drawn through the lower margins of each of the nasal cavities. This plane, like the palatal plane in the lateral cephalogram, divides the facial skeleton into an upper (orbitonasal) part and a lower (oral) part.

The superior nasal plane is drawn at the level of the roof of the nasal cavity through the cribriform plate. As this may vary somewhat in shape, the plane is constructed as a line between the points where the cribriform plate shadow (nasal cavity roof) cuts the inner orbital margin of each side (Fig. 1).

From these orbital points two parallel lines are drawn to meet the mental plane. These are the right and left medial orbital planes.

USE OF THE FRONTOFACIAL RECTANGLE

The distance between the superior and inferior nasal planes corresponds to the distance betwen the cranial base plane and the palatal plane as seen in lateral cephalograms and is an indication of the vertical height of the upper

From the Anatomy Department, Queen's University.

facial skeleton (nasal cavity). There will not be an exact correspondence, however, as the cranial base plane does not exactly correspond with the superior nasal plane owing to the position of nasion related to the cranial base.

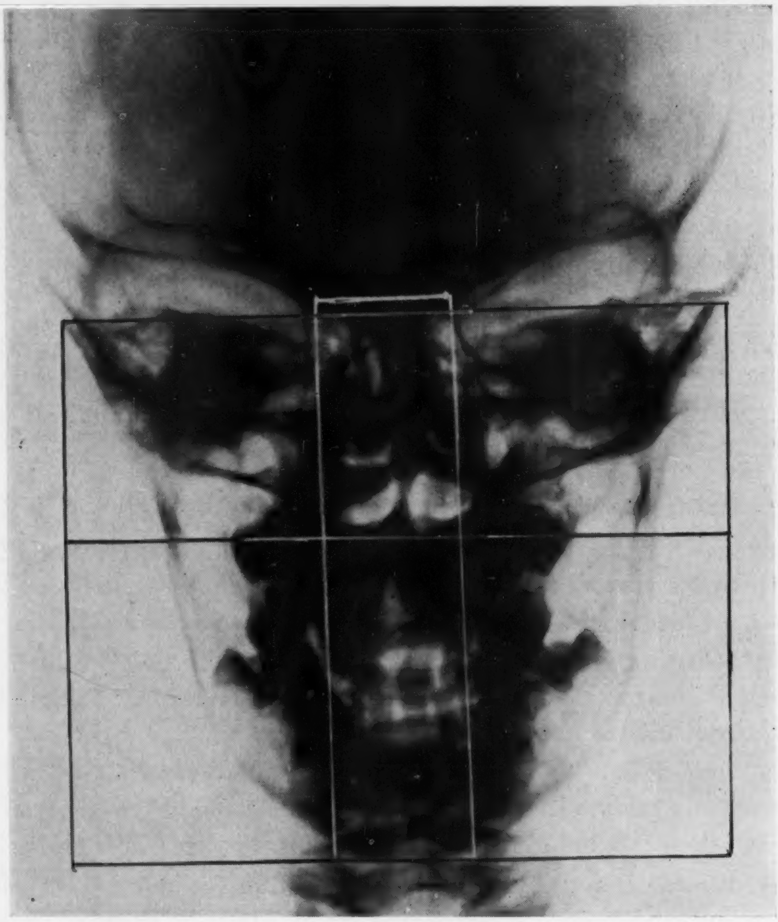

Fig. 1.—Frontal cephalogram showing the frontal facial rectangle.

The distance between the inferior nasal and mental planes corresponds closely to that between the palatal and gnathial planes used in the analysis of lateral cephalograms. They delimit the lower facial skeleton which contains the upper and lower dentitions, their supporting alveolar bone, and the body of the mandible.

The region between the medial orbital planes, like the cribriform plate region (middle segment of the cranial base), as seen in lateral cephalograms, is a relatively stable region after the third year. The upper part (interorbital region) of the nasal cavity, which is bounded above and at the sides by the ethmoid bone, reaches adult dimensions by about the seventh year of life.

The distance between the medial orbital planes (middle facial width) and the distance between the lateral orbital planes (lateral facial width) enable us to distinguish between two components of the wide and narrow face: (1) in

which the interorbital region is wide or narrow (middle facial width) and (2) in which the total face width varies. The latter is estimated by the distance between the lateral orbital planes and the extent to which the zygomatic arches, the external palatal arches, and the mandibular angles extend toward or beyond the lateral orbital planes of each side.

THE ANALYSIS OF FACIAL GROWTH AS SEEN IN FRONTAL CEPHALOGRAMS

Growth in Facial Width.—During fetal life and until the first year after birth, the sagittal suture system is complete.[2] It consists of the interparietal, interfrontal, internasal, and intermaxillary sutures; the fronto-ethmoidal and cribriform plane sutures; the mandibular symphysis; and the synchondrosis between the body and great wings of the sphenoid. During the first year the

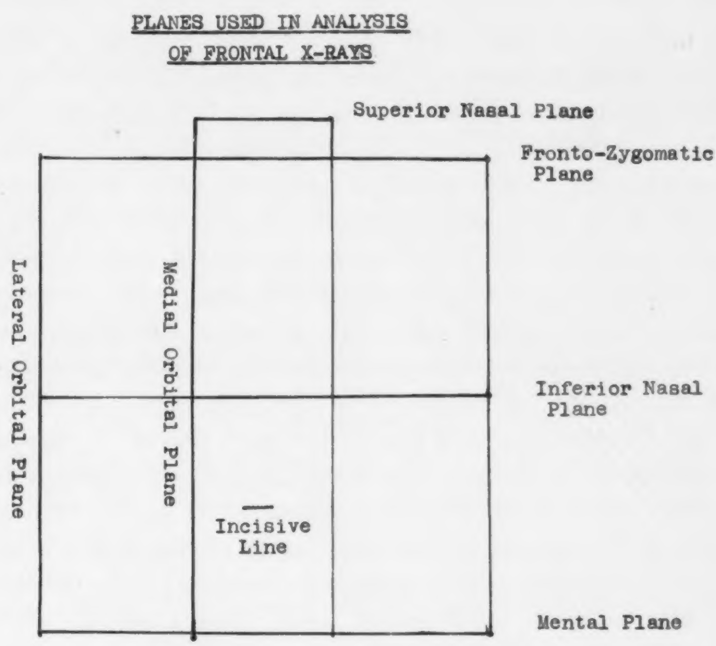

Fig. 2.—The planes used in the construction of the frontal rectangle.

frontal bones unite (except in the rare cases which show persistent metopic sutures), the two halves of the mandible unite, and the great wings unite with the body of the sphenoid. Between the first and third years the mesethmoidal (perpendicular plate) and lateral or facial parts of the ethmoid unite. After this time only the midpalatal (intermaxillary and interpalatal) and internasal sutures remain of the sagittal suture system, and it is doubtful that any growth takes place in these sutures after the first years of life. Any further growth that may take place in the interorbital width (between the two medial orbital planes) will be the result of surface deposition at the medial wall of the orbital cavities, and this is unlikely to be great in amount.

Growth in width of the outer part of the facial skeleton (increasing the distance between the medial and lateral orbital planes of each side) will be the

result of growth at the zygomaticomaxillary sutures associated with surface deposition at (1) the zygomatic arches, (2) the upper and lower alveolar processes, and (3) the rami of the mandible. Growth at the zygomaticomaxillary suture probably persists for a longer time than at any of the other facial sutures and is probably associated with growth of the orbital cavity (which is almost completed by the age of 7 to 10 years) and, to a limited extent, with growth of the width of the cranium with which it is associated through the zygomatic arch. The degree of flare of the zygomatic arches is also related to the development of the muscles of mastication. Growth in width of the palate is correlated with that of the zygomatic arches only to a limited extent.[3] Growth in width of the mandible with regard to both alveolar and basal parts is entirely a matter of surface deposition after the union between the two halves at the symphysis in the first year of life.

Growth in Facial Height.—This is more readily analyzed in lateral cephalograms.[1] A line drawn between the lower borders of the orbital cavities as seen in a frontal cephalogram divides the nasal cavity into an upper (interorbital) part and a lower (maxillary) part. The upper part, which is largely concerned with the sense of smell, reaches its full development early (by about the seventh year), while the lower part, which is more closely related with the respiratory apparatus, continues to increase in size in association with the descent of the palate. Up until about the seventh year this is largely the result of a descent of the maxillary bones and is regulated by growth at the cartilage of the nasal septum. After about the seventh year it is the result of a different growth process—the coordination of surface deposition (on the oral surface) and surface absorption (on the nasal surface) of the hard palate. Growth in width of the lower nasal cavity is the result of a similar process of bone deposition and absorption at the lateral nasal wall and is associated with growth of the maxillary antrum. There is no evidence of any high degree of correlation between growth in width of the lower nasal cavity and of the alveolar arches, but this is one of the many features in the analysis of facial growth which require further elucidation.

Growth in height of the upper alveolar region (subnasal segment of the upper facial height dimension) is independent in its development of the nasal segment and is related to the full development and use of the masticatory apparatus. The lower facial segment (from the inferior nasal plane to the mental plane) includes the upper alveolar region and the mandible. This also is largely independent in its growth of the nasal segment, although a high upper facial skeleton is sometimes associated with a high lower alveolus.[1]

DISCUSSION

Analysis of growth in width of the facial skeleton has been neglected in comparison to work on growth in height and depth (as seen in lateral cephalograms). It is related to a greater or lesser extent with growth of the nasal cavities, the orbital cavities, the palate, the mandible and the cranial part of the skull, and

the muscles of mastication. Growth of the facial skeleton shows a low correlation with growth of the cranium.[4] There is only a limited correlation between growth of total (bizygomatic) facial width and palatal width,[3] and there is little correlation between such features as growth in width of the orbital cavities, the nasal cavities, and the palate. Much more work remains to be carried out on these features of normal facial growth, however, to be followed by studies on the nature and analysis of various forms of facial deformity and malocclusions. The facial skeleton should be considered as a unit built up of a number of semi-independent regions, each with its own pattern of growth and development. Certain regions, such as the orbital cavities, the upper parts of the nasal cavities, and the lower border of the mandible, appear to show a high degree of independence of functional activity in their development and to be largely under control of genetic factors in their determination. In these parts of the facial skeleton we would expect to find the greatest evidence of familial likeness. Other regions, such as the alveolar processes, the zygomatic arches, the angles of the mandible, and the lower parts of the nasal cavity, probably show a greater response to functional variations. This would appear to be especially true of the alveolar bone.

SUMMARY

A simple frame of reference is described for use in the analysis of craniofacial morphology and growth as seen in frontal cephalograms. Certain important regions in the skeletal framework of the face are described briefly in relation to growth in the vertical and horizontal dimensions.

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A PHOTOGRAPHIC METHOD OF MEASURING ERUPTION OF CERTAIN HUMAN TEETH

P. H. Burke, B.D.S., H.D.D., and D. J. Newell, M.A., F.S.S.,
Newcastle upon Tyne, England

THIS study has been divided into two parts. The first is an account of a method of measuring eruption of certain human teeth, and the second is a statistical description of the curves of eruption and the accuracy of the method.

PART I

Introduction.—The paucity of serial observations of actively erupting teeth in the human being is remarkable. A study of this subject requires accurate serial observations separated by intervals of not more than a few days to bring to light any changes of short duration in the rate of eruption. Serial radiographic observations of human erupting teeth[1] must be separated by a lengthy time interval, measured in days, since the host has a limited tolerance to roentgen rays. Therefore these cannot illustrate minute changes in the rate of eruption, such as those reported for the rat molar by Hoffman and Schour,[2] who used vital staining methods. There is no limit, however, to the frequency with which serial photographic observations of clinically erupting teeth may be recorded if the eyes of the subject are protected from the source of photographic illumination. This study was an attempt to obtain a series of photographic observations of the clinical eruption of the permanent maxillary central incisors in one person under uniform conditions.

A problem posed by this observational exercise was the choice of a fixed point or plane from which to measure the movements of erupting teeth. There is no agreement upon the location of such a fixed point or plane in the skull during growth. This is illustrated by the fact that four observers who have examined serial records of erupting teeth in the human being have chosen four different planes of reference. Broadbent,[3] who has also graphically illustrated tooth eruption in a moving film derived from cephalometric radiographs, used serial outline tracings of such radiographs which were superimposed upon a point located by landmarks in the base of the skull (registration point "R"). Using similar records, A. G. Brodie[4] superimposed tracings upon slightly different landmarks, also in the base of skull ("SN" line). Both of these workers examined eruption qualitatively.

From the Orthodontic Department, Newcastle upon Tyne Dental Hospital, College Street, Newcastle upon Tyne, Zone 1, England.

In contrast, Carlson[1] measured eruption upon the same type of cephalometric radiographs. He confined measurements of the amount and rate of eruptive movements to certain mandibular teeth, since his "fixed" plane was "a tangent to the inferior border of the mandible." Five series of radiographs, each one covering an age range of at least ten years, were examined by Carlson; the interval between radiographs was six months or more. This work provides the most complete serial quantitative data on eruption in man found in a search of the literature. The recent work of Björk[5] is of interest with respect to the stability of the lower border of the mandible in the human being during growth.

In the clinical field, Gottlieb and Orban[6] commented upon the opportunity for observation of eruptive movements when a tooth becomes ankylosed and, therefore, a fixed point in the arch. They noted that, in addition to the rapid movement carrying the erupting tooth into occlusion after clinical emergence, there is slow movement of the teeth which form the occlusal plane.

Since there are plainly difficulties in measuring the absolute movement involved in eruption, it seems wise to reconsider the definition of tooth eruption. Gottlieb[6] defined two components of eruption:

> (1) The active movement of a tooth in the direction of the occlusal plane is designated as *active* tooth eruption.
>
> (2) As the bottom of the gingival crevice shifts apically the clinical crown becomes longer at the expense of the clinical root. This . . . is designated as *passive* tooth eruption.

Our concern is to measure the first component without distortion due to the second component. This rules out the gingival crevice as a point from which to measure eruption and suggests that the occlusal plane be used for this purpose. Unfortunately, the occlusal plane itself is not static during growth. In the sagittal plane, relative to the base of skull, it is displaced downward and forward as a stable unit maintaining its angular relationship to the adjacent structures of the face over the age range under consideration.[7] The bulk of this displacement is due to remote facial growth and can be ignored for the purposes of this study. The remaining displacement is due to slow eruption of those teeth forming the occlusal plane, as noted by Gottlieb.[6] This is associated with the apposition of bone at a slow rate in the fundus of the socket and the formation of secondary cementum[2, 8] and cannot be ignored, since it moves the occlusal plane in the same direction as that followed by the actively erupting teeth. Data on the relative velocities of actively erupting teeth and teeth forming part of the occlusal plane are available for the rat molar only,[2] since vital staining methods alone give a true fixed point in the field of bone growth relevant to tooth eruption. The rate of active eruption of the rat molar before achieving occlusion was recorded to be more than 800 μ a week, and the rate of eruption when this tooth formed part of the occlusal plane between the ages of 400 and 500 days was 13 μ a week. The relative magnitude of these figures, while not applicable *per se* to man, does not suggest

that the use of the occlusal plane for measuring eruption would introduce grave inaccuracies in calculating rate and amount of eruption. There are other practical considerations. The positions of the actively erupting teeth and part of the occlusal plane can be conveniently recorded in an intraoral photograph. The physical nature of the components of the occlusal plane (that is, the teeth) and the clamping effect of the bite are better suited than soft tissues for fixation of the skull for serial records over a short age range. For these reasons, the occlusal plane was chosen as a base line against which to measure the movements of active eruption in this study.

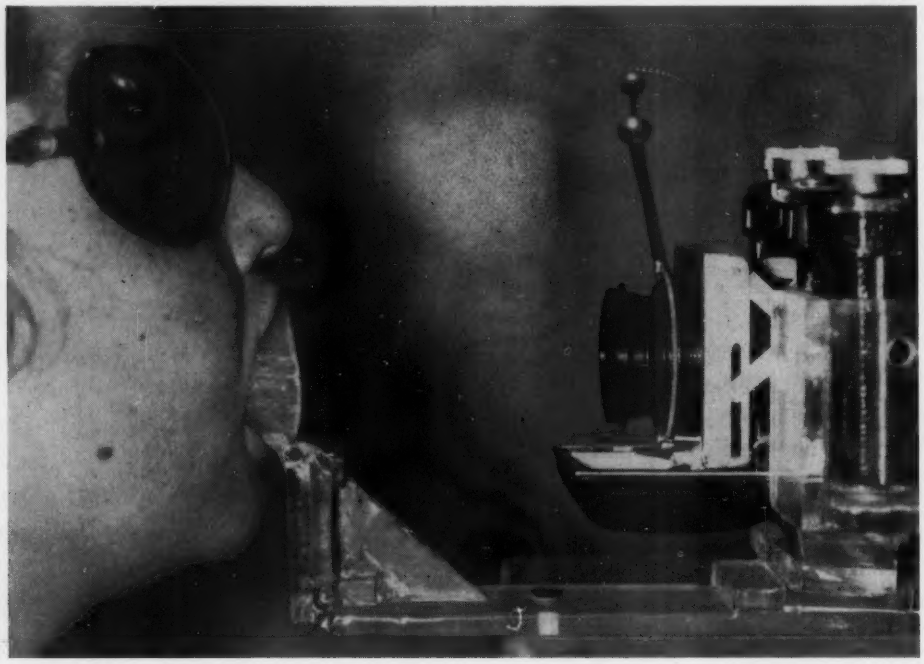

Fig. 1.—Fixation of subject for intraoral photograph.

Method.—Each evening at about the same time the subject fixed the position of her teeth, and an intraoral photograph was recorded (Fig. 1). Fixation was accomplished by the clamping effect of the bite upon a bite block into which upper and lower deciduous molars occluded. The lips were automatically retracted. The bite block was rigidly connected to a cradle in which a 35 mm. camera was a "friction fit" (Fig. 2). This appliance was fabricated in acrylic resin and was aligned so that the central ray of the camera lay along the midline of the maxillary arch at the level of the occlusal plane. It was mounted with suitable illumination on a heavy base. A series of daily intraoral photographs covering a period of about one year was obtained in this way (Fig. 5).

At the time of eruption of the permanent incisors there is, in most children, an increase in arch width which affects the deciduous canines most and decreases posteriorly.[9] In this subject measurements on study models showed that the

increase in arch width between the first deciduous molars was 0.7 mm. and that the increase between the second deciduous molars was 0.3 mm. during the observational period. Perhaps due to the slight mobility of the teeth permitted by the periodontal membrane,[10] the increase in arch width did not appear to interfere with adequate fixation of the skull.

The different positions occupied by the actively erupting teeth were measured on enlarged projected images of the series of photographic negatives. The images of the lowest points of the incisal edges of the maxillary deciduous lateral incisors were joined by a straight line which was, therefore, in constant relationship to teeth forming part of the occlusal plane (Fig. 3). This was the plane of reference relative to which the movements of the erupting teeth were to be measured. It was therefore necessary to orient each of the series of negatives so that the images of the incisal edges of the deciduous lateral incisors rested upon the base line before examining the positions of the actively erupting permanent central incisors. This procedure is illustrated in Fig 3; the outlines of the positions of the erupting teeth during part of the period of observation show the movements of active eruption and the pattern of passive eruption.

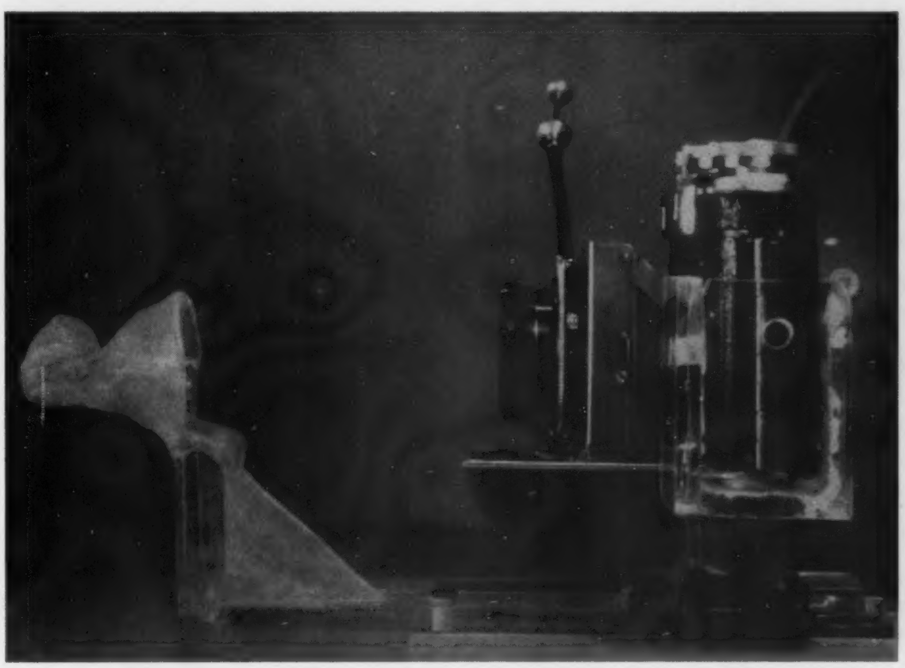

Fig. 2.—Photographic apparatus showing alignment of bite block to camera.

The actual measurements were taken by direct readings on the enlarged images, using a vernier ruler measuring to 0.1 mm. (Fig. 4). The extendable portion of the ruler carried an interrupted outline tracing, drawn with a 6H pencil, of the incisal edge of the enlarged image of one of the actively erupting central incisor teeth. When the negative was correctly oriented on the base line, the ruler was extended in a direction perpendicular to the occlusal base until the

outline tracing coincided with the actual image of the incisal edge of the actively erupting tooth. A direct reading for that particular date was then recorded from the vernier ruler. Subsequent negatives were examined in the same way throughout the series, and the procedure was repeated for the other central incisor tooth. These readings were corrected for enlargement and the angulation of the path of eruption to the central ray of the camera in the sagittal plane, which was estimated from lateral skull radiographs to be 70 degrees.

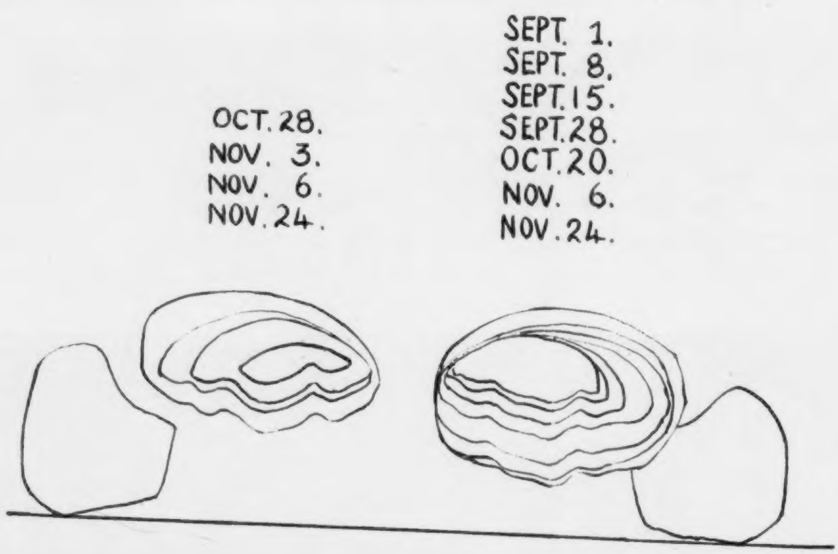

Fig. 3.—Built-up tracing of projected images of the teeth superimposed on the deciduous lateral incisors showing the movements of active and passive eruption of the permanent central incisors.

Clinical History.—The subject was a girl of good physique and normal health, aged 7 years 1 month (March 15, 1952) when the observations began. The dentition was free from overcrowding and was normal, except for the congenital absence of the permanent maxillary left lateral incisor and the secondary effects of this absence (Fig. 5). Slight mobility of the maxillary deciduous central incisors suggested the onset of preclinical eruption of the permanent successors. Intraoral radiographs showed the right permanent tooth to be erupting ahead of its fellow. This probably explains the displacement of the right deciduous central incisor when the girl was biting an apple two months later (age 7 years 3 months, May 15, 1952). This tooth was extracted digitally, the underlying permanent tooth being neither palpable nor visible, and in a short time the epithelium re-formed. No further clinical change occurred for some ten weeks, when the left deciduous central incisor exfoliated normally (July 31, 1952) and its successor, which was immediately palpable, emerged clinically within a few days (age 7 years 5.5 months). This tooth erupted actively for a further ten weeks before being joined by its fellow on the right side, which erupted clinically some five months after the early loss of its predecessor (age

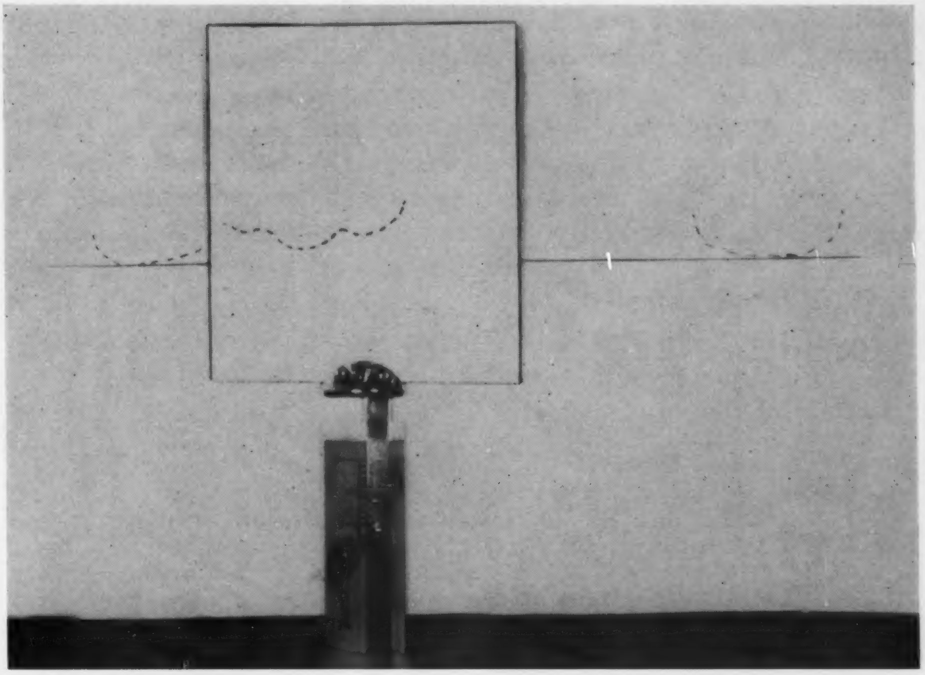

Fig. 4.—Vernier ruler in use for direct measurements of projected images of teeth.

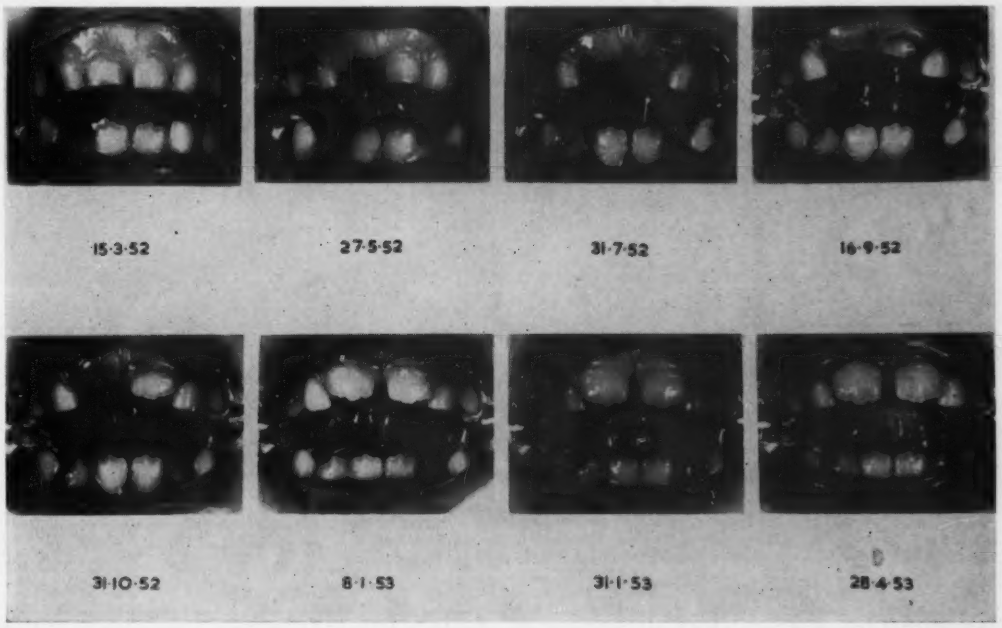

Fig. 5.—Examples of the series of intraoral photographs showing clinical stages during period of observation.

7 years 8 months, Oct. 31, 1952). Three months later, as the period of active eruption for both teeth was nearing its close, the child had her only constitutional disturbance during the period of observation—acute tonsillitis with

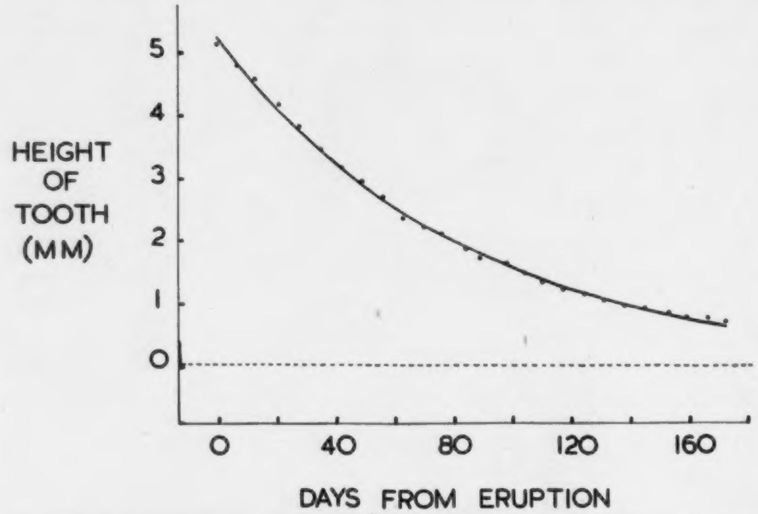

Fig. 6.—Fitted eruption curve for upper left central incisor. Distance from datum line by days from clinical eruption. The dotted line represents the estimated final position of the tooth.

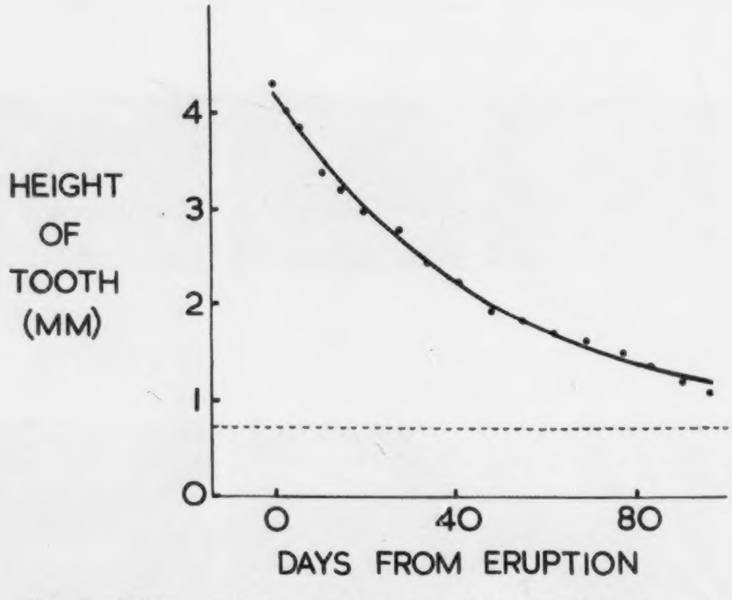

Fig. 7.—Fitted eruption curve for upper right central incisor. Distance from datum line by days from clinical eruption. The dotted line represents the estimated final position of the tooth.

pyrexia (age 7 years 11.5 months, Feb. 1, 1953). The onset of slight mobility of the maxillary deciduous lateral incisors by the age of 8 years 3 months brought the observations to a close.

Findings.—The paths of eruption are most conveniently illustrated by plotting the distance, in millimeters, of the tooth from the base line against

the time, in days (Figs. 6 and 7). The eruption curves were found to be smooth with a gradually decreasing gradient. In other words, the rate of active clinical eruption of these teeth was maximal at the time of clinical eruption and began to decrease thereafter. There were no long periods of rest or gross rhythmic variations in the eruption rate. There were, however, random variations of a minor character in the rates of eruption which could not be explained on the grounds of experimental error (Part II). The rates of active clinical eruption of the two teeth differed, the later tooth (right central incisor) erupting at a faster rate.

It was known from a series of standardized intraoral radiographs of these teeth that the active preclinical eruption of the right central incisor had been brought to a standstill after the extraction of its deciduous predecessor.[11]

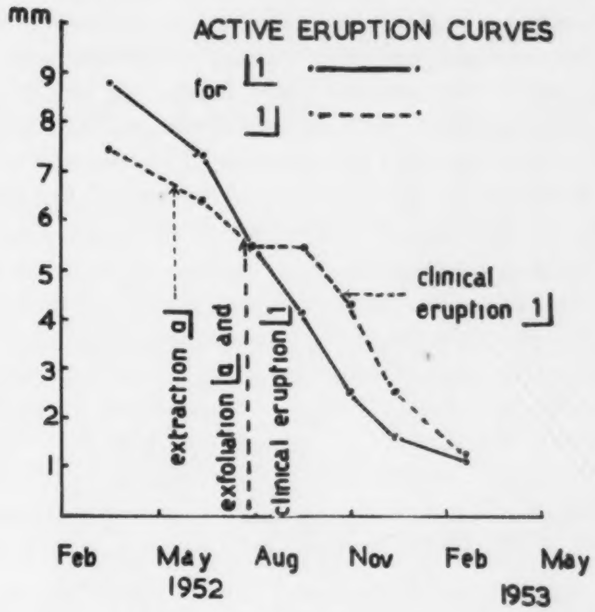

Fig. 8.—Active eruption curves derived from intraoral radiographs.

Active eruption curves were derived from these radiographs, using similar methods of measurement. Although poorer contrast and resolution on the radiographs did not permit the degree of accuracy which was obtained with the photographs, the general form of the preclinical and clinical active eruption curves may be seen (Fig. 8). The form for the left central incisor is a smooth "sigmoid" curve, uninterrupted by clinical emergence. In contrast, that for the right central incisor shows a plateau, indicating absence of active eruption at about the level of clinical emergence of its fellow. This delay was thought to be due to re-epithelization of the mucous membrane after the early loss of the deciduous tooth. The delayed tooth resumed movement before clinical emergence, and its rapid rate of clinical eruption almost enabled it to resume parity with its fellow in a period of some three months. Nevertheless, although the rates differed, both curves of clinical eruption followed the same pattern.

Near the end of active eruption the child was feverish, and both central incisors moved appreciably in each of two days at a time when the daily increment of eruption was too small to measure. This abrupt change of pattern terminated the measurement of active eruption by this method. This movement was presumed to be an abnormal displacement due to vasodilatation of the rich vascular plexus found beneath the papilla of an erupting tooth.

In the first fortnight after clinical eruption the respective rates of active eruption were 2.2 mm. per month for the right central incisor and 1.2 mm. per month for the left central incisor. Up to the time of disturbance in the pattern of eruption associated with the pyrexia, the amounts of active eruption were 3.2 mm. for the right central incisor and 4.4 mm. for the left central incisor. At this time, although the teeth appeared nearly level, measurements showed that the left central incisor was 0.3 mm. below its fellow. The difference in the amounts of active eruption was explained by the lower level of clinical emergence of the delayed right central incisor. The mucous membrane had been carried 0.9 mm. nearer to the occlusal plane before perforation had occurred. This agreed with the suggestion that healing of the epithelium had obstructed clinical emergence of the crown. In this case the abnormality in the closely related processes of exfoliation and clinical emergence of the succeeding tooth had interfered with the pattern of eruptive movement.

The pattern of passive eruption was initially a shallow crescent which embraced the central mamelon. The crescent rapidly expanded to include first the mesial aspect and then the whole incisal edge, receding obliquely during the early stages of active clinical eruption (Fig. 3). There was little change during the rest of the period of active clinical eruption. This pattern would appear to be caused by the atrophy of epithelium which finds itself resting on avascular enamel due to the movements of the erupting tooth. The juxtaposition of the curved labial surface of the emerging clinical crown and the rounded labiopalatal contour of the alveolus would produce such a pattern under these circumstances.

Discussion.—Although the dangers of generalization from such isolated observations as these are realized, it is interesting to speculate on the similarity between the curves of active eruption and certain growth curves as discussed in Part II. At first sight there can be little significance in any similarity between the linear movement of eruption and increase in bulk due to cellular proliferation. Sicher,[12] however, believes that the fundamental mechanism of active tooth eruption is cellular proliferation in the rich cellular layer of the dental papilla adjacent to the epithelial apical foramen. Since the dental papilla is confined within a rigid walled cavity by the calcified tissues of the tooth, an increase in bulk of the dental papilla due to cellular proliferation would have to be expressed apically, thus inducing eruptive movement. If the apical foramen retains the same cross-sectional area during active eruption the linear movement would be directly proportional to the increase in bulk due to cellular proliferation. For many reasons the size of the apical foramen of an actively

erupting tooth cannot be even estimated from radiographs, but the walls of the pulp of many teeth which have just completed their active eruption would appear to be parallel. If this were really true, then it would be expected that the movements of tooth eruption would follow the mathematical laws applicable to cellular proliferation. Hence, these observations, if confirmed, would support Sicher's theory of tooth eruption.

PART II. ANALYSIS OF DATA

The Type of Curve Fitted.—As can be seen from the radiographic study of the upper left central incisor (Fig. 8), the general form of the curve is sigmoid, with an increasing rate of eruption before the time of clinical eruption, and thereafter a decreasing rate of eruption.

In a critical survey of the mathematical form of growth curves, S. Brody,[13] suggests that sigmoid curves are best studied in two parts—the self-accelerating phase and the self-inhibiting phase. The junction between the two phases in measurements of height or weight occurs during puberty in animals and during flowering in plants. The corresponding point in the growth of a tooth appears to be the time of clinical emergence, when the rate of eruption is at its maximum.

The detailed photographic records for the two teeth in the present study are available for the clinical eruptive or self-inhibiting phase. The appropriate theory (following Brody) is that the instantaneous rate of growth is proportional to the amount of growth yet to be made.*

Thus, for an upper tooth of height y above its final level, the rate of decrease in height is proportional to the height at any time. That is:

$$-dy/dt = cy \tag{1}$$

where c is the constant of proportionality.

Integration of equation 1 gives

$$y = be^{-ct} \tag{2}$$

where b is the height at time $t = 0$ (the time of clinical eruption).

In this series of observations, however, it was not possible to measure the final position of the tooth, for two reasons: the sudden disturbance of the even growth at the onset of tonsillitis on Feb. 1, 1953 (age 7 years, 11.5 months), and the loss of the datum line provided by the adjacent deciduous incisors (age 8 years, 3 months). For the observations up to the end of January, 1953, there was a fixed datum line, but its distance from the final position of the tooth was unknown. Accordingly, the curve (equation 2) was modified to the following form:

$$y = a + be^{-ct} \tag{3}$$

where a, b, and c are all estimated from the data. In equation 3, t is the time

*An alternative form of growth curve is suggested by Hoffman and Schour,[2] who refer to the curve charting the rate of tooth elongation in a rat as "a typical hyperbolic growth curve of postnatal development." The particular type of curve fitted must depend upon the underlying physiologic theory. Without entering into a discussion of this theory here, we merely point out that hyperbolic and exponential curves are often very similar in shape and that our data for the growth of the upper right central incisor are fitted as well by the hyperbola

$$y(\text{mm.}) = 4.21 - \frac{10t}{2t + 125}$$

as by the exponential curve given.

from clinical eruption in days, y is the height of the tooth above the datum line at time t, a is the estimated final height above the datum line, b is the estimated initial height above the final position, and c is a measure of the rate of growth. The tooth reaches half its final length in $0.693/c$ days, and three-quarters of its final length in twice this time.

The Experimental Measurements and Their Accuracy.—The data for this analysis are measurements of photographic projections (see Fig. 4) at approximately weekly intervals throughout the period of observation. Some negatives were rejected when contrast or definition was not good for one reason or another (for example, condensation on the lens from the subject's breath). Such negatives were replaced by the nearest sharply defined film, making the data not exactly evenly spaced in time. This is taken into account in the analysis.

Each projection was measured independently four times. From the differences between the four observations on each projection, the accuracy of the measuring technique can be determined. An analysis of variance method shows that there was no difference in accuracy between the measurements on the two teeth and that the standard deviation (s) of a single observation is $\pm$ 0.030 mm.

Hence, the standard error of the mean of four observations, that is, the accuracy of the points plotted on the graph, is $\pm s/\sqrt{4} = \pm 0.015$ mm.

It is considered that this accuracy is quite adequate for the measurements in view of the magnitude of the changes in position of the tooth from week to week. Measurements are available on request.

Evaluating the Constants.—When the mean values of the four observations are plotted against the number of days from eruption, a curved regression is obtained with approximately uniform scatter about it (Figs. 6 and 7).

S. Brody[13] gives the following method for calculating the constants:

Transform the equation (3) into its logarithmic form, $\log_e (y - a) = \log_e b - ct$.

Choose some value of a, and plot $(y - a)$ against t, on log $\times$ linear paper. The plot will be approximately a straight line if a is correctly chosen; too large a value of a will give a line curving downward, and too small an a will give a line curving upward. When the best value of a has been found by trial and error, the constants $\log_e b$ and c are found by standard linear regression methods.

A different, admittedly more time-consuming, technique has been used for this article. The constants a, b, and c have been calculated to make the sum of squared deviations of the observed points from the curve (3) a minimum. This differs from Brody's method, which concludes by reducing to a minimum the sum of squared deviations of the *logarithms* of the observed points from the *logarithms* of the corresponding predicted points. As has been pointed out by Deming,[14] if the points themselves are liable to uniform error, the points on the logarithmic plot will have increasing error as y decreases, which violates the assumptions of linear regression analysis. The present analysis is based on the numbers themselves and not the logarithms.

This method of analysis gives the eruption curves as follows:

Upper left central incisor.

$$y \text{ (mm.)} = 0.064 + 5.217\ e^{-0.0123\ t}$$

Upper right central incisor.

$$y \text{ (mm.)} = 0.733 + 3.476\ e^{-0.0210\ t}$$

Interpretation.—The different values of the constant a (0.064 and 0.733) mean that if this pattern continues the left tooth eventually would nearly reach the datum line, while the right tooth would stop about ¾ mm. above it.

The constants b differ, as the left tooth had about 5 mm. to grow after clinical eruption, but the right tooth had only about 3.5 mm. to grow.

The constants c show the different instantaneous rates of growth of the two teeth. Whereas the left tooth took $0.693/0.0123 = 56$ days to reach half its final height, the right tooth, which had been delayed, took only $0.693/0.0210 = 33$ days to reach half its final height.

It is interesting to compare this result with that of Osborne and Mendel.[15] Investigating the growth of rats after long suppression of growth by dieting, they found that the "curve of growth after the period of suppression was as a rule comparable with that of a growing rat of the same size and sex. The usual rate of body increment was not diminished, but was, if anything, somewhat accelerated during the resumption of the growth function." Although it is dangerous to generalize from the relative growth rates of only two teeth and a few growth-retarded rats, it appears in these instances that after a delay growth proceeds at a faster rate than it would have without the delay.

Goodness of Fit.—If the fitted curves exactly represent the growth of the teeth and the only source of error is that in measuring the projected images, the deviations of the plotted points from the curve should be consistent with the standard error of the mean of four observations, namely, ± 0.015 mm. In fact, the residual variation about the fitted line has a standard error of ± 0.060 mm., which is significantly larger.

This means that the curve does not fit the observations closely enough for a measuring technique of this high accuracy. Thus, either (a) the natural growth is not strictly exponential or (b) the natural exponential growth is masked in this experiment, for some reason. Possible reasons for masking, if (b) is true, are slight inaccuracies in positioning the head on the bite block or some interference with natural growth of unknown origin (for example, mild trauma). Inspection of the fitted curves (Figs. 6 and 7) shows a tendency, quite well marked in the left tooth, for the lower-than-predicted points to follow each other. This is inconsistent with the idea of inaccurate positioning of the bite block, since this would probably lead to a scatter randomly above and below the line. We conclude that these deviations are probably caused by trauma.

However, the goodness of the fit of these curves to equations of this type is strong evidence that the growth process underlying the eruption of these teeth is self-inhibiting and not accretionary. If this growth process had been

accretive, a quite different growth curve would have been obtained. For example, a nail grows at a uniform rate unless affected by illness or seasonal variation.[16] The growth curve, therefore, approximates a straight line. If these findings for tooth eruption can be confirmed, it would appear that the underlying growth process is nonlinear and is described by the self-inhibiting theory.

SUMMARY

1. A photographic method of measuring active clinical eruption of human permanent maxillary central incisors is described.

2. The readings were analyzed statistically to assess the experimental error, define the eruption curve, and discuss their fit.

3. The eruption curve of each tooth is fairly well described by an exponential curve with slight deviations.

We wish to thank Professor R. V. Bradlaw and Dr. J. Tanner for their guidance and help. We are also grateful to the Department of Photography, Medical School, King's College, Newcastle upon Tyne, for the illustrations of the fitted curves; the Department of Photography, Newcastle upon Tyne Dental Hospital for the remaining illustrations and advice; and Mrs. D. Weightman and Mrs. J. Freeman who assisted with the computations.

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Orthodontic Profiles

RODRIGUES OTTOLENGUI

> There are two distinct classes of men: first, those who work at enlarging the boundaries of knowledge and, secondly, those who apply that knowledge to useful ends. *R. W. von Bunsen.*

WHEN it was "hinted" that I prepare the profile of Dr. Ottolengui, a prominent figure in the pioneer days of orthodontia,* the thought occurred to me that here was an opportunity to record a phase of orthodontic history that has long been overlooked, namely, the influence of dental journalism on its development and the influence of those who helped "apply that knowledge to useful ends." The first of these men whom I will consider is Rodrigues Ottolengui.

Dr. Ottolengui was born on March 15, 1861, in Charlestown, South Carolina. His father, Daniel Ottolengui, was a newspaperman and his mother was an author. Thus, he had a literary heritage that he later utilized to great advantage. His grandfather, Benjamin Adolph Rodrigues, was a pioneer dentist of South Carolina who had achieved national renown, and who had studied under the famous C. Starr Brewster.

To detail Dr. Ottolengui's activities in dentistry would require most of the pages of this issue of the JOURNAL, for, as is true of most men of great intellect, he had many accomplishments to his credit.

A facile writer, with an abundance of ideas, he ranks among the aggressive dental writers of his day. For many years he contributed to dental literature, aside from his editorial writing. Early in his professional life he also attained considerable distinction in the field of fiction. In addition, he took a lively interest in all professional activities. He was one of the leaders in the reorganization of the National Dental Association (now the American Dental Association) and in its present plan of operation; as chairman of the Dental Relief Committee he originated the now famous Christmas seals.

He inherited his interest in dentistry from his grandfather and obtained his dental education under preceptorship. He was fortunate in attracting the

Dr. Bernhard Weinberger, the well-known historian of dentistry and orthodontics, kindly consented to write the profile of Dr. Rodrigues Ottolengui of New York. Inasmuch as Dr. Ottolengui was one of the earliest to edit and publish orthodontic manuscripts, Dr. Weinberger included in the profile something of the history of journalism, as related to orthodontics. *Dental Items of Interest* and *Dental Cosmos* published much of the early manuscript of orthodontics. *Editor.*

*The use of the words *orthodontia* and *orthodontics* might confuse the reader, for it was not until around the 1920's that the latter word came into general use. Previously *orthodontia* was used; therefore, I have retained it in respect to time.

attention of Dr. William A. Atkinson, then dean of the dental profession, who opened his doors to the young practitioner and welcomed him to bring patients for advice and assistance. In later years Dr. Ottolengui repaid this debt by giving freely of his time, accumulated knowledge, and experience to other young practitioners.

His tireless zeal and indefatigable energy attracted the attention of Dr. Norman W. Kingsley, who was noted as a skillful prosthetics worker, as an orthodontist, and as the originator of the then most satisfactory method of treating cleft palate. Dr. Kingsley recognized in Dr. Ottolengui an apt pupil. Before he would take him under his wing, however, he exacted a promise that any patient requiring cleft palate treatment, if unable to pay, should receive this service free of charge.

AVOCATIONS

Dr. Ottolengui's interest in photography gained him recognition as a member of the New York Camera Club, especially for his "pinpoint" prints of landscapes and for credible examples of portraiture, many executed in the Rembrandt style.

As a friend of Kingsley, he competed with him in pyrographic etchings on wood, then an interesting hobby.

As a young lad he thought it fun to run about the fields catching butterflies and moths. A clergyman who encountered him one morning asked whether he was doing that for fun or for study. Quick to reply, Ottolengui stated, "For study." It was this experience that led him to collect in earnest; as his collection grew he found it necessary to restrict himself to a particular field, a noctuid moth known as the *plusiidiae*. In time this collection outnumbered those in the British Museum and in Washington. Because of its importance, it was deposited in the American Museum of Natural History, where it has been allotted special space and labeled "The Ottolengui Collection."

In order to improve his knowledge of literature, Dr. Ottolengui turned to reading detective stories, feeling that such stories helped to increase the analytical qualities of the mind which he considered an essential faculty in connection with diagnosis. This type of reading had a profound influence upon him, so that he decided to take a hand at writing some detective stories himself. His first stories appeared in the old *Black Cat Magazine*. Being successful, he turned to writing novels. The first was entitled *The Artist in Crime*. Editions of this work appeared in England, France, Germany, and Poland. There then followed *The Modern Wizard, A Conflict of Evidence, The Crime of the Century, The Phoenix of Crime,* and *Final Proof, or, the Value of Evidence*. In many of these novels, which were written in the 1890's, Dr. Ottolengui wove original theories (for example, that mental diseases could be traced to infection of the teeth and that identification of murdered victims could be made if dentists would prepare and keep accurate records of patients). All later proved to be sound and practical.

ORTHODONTICS

It was only natural that Dr. Ottolengui, being close to Dr. Kingsley, would interest himself in the "regulation of the teeth," as orthodontics was then known. This was the title of his first paper, published in the *International Dental Journal* in 1892. Then came "Thumb-Sucking and Its Influence on Irregularities," "Jumping the Bite," "Torsion of the Teeth," "Jumping the Bite, a Reply to Drs. Talbot and Case," "Protrusion of Upper Jaw," "Method of Regulating Teeth," "Extraction and Delay Versus Expansion" and others.

RODRIGUES OTTOLENGUI

Dr. Ottolengui joined the American Society of Orthodontists in 1902, and at the Society's meeting that year he read a paper on "The Retrusion of Both Jaws With a Single Appliance." "A Study of Occlusal Relations in Cleft Palate Cases" (1904), "The Ankylosis of Living Teeth" (1905), "A Contribution to the Knowledge of the Etiology and Treatment of Cases in Class II" (1907), and "The Physiological and Pathological Resorption of Tooth Roots" (1913) are a few of his papers. He presented an important paper on orthodontia before the Jamestown Dental Congress in 1907.

As one of the outstanding nonspecializing orthodontist members he served the American Society of Orthodontists as president in 1906. It was at that meeting that Dr. Ottolengui brought up the question of commissions and introduced the following resolution, which was adopted:

Resolved, That in the opinion of the members of the American Society of Orthodontists, the practice of paying a commission, honorarium, or any sort of fee with a consideration for the reference of a patient is both unwarranted and unprofessional; and be it

Resolved, That the payment of any commission, honorarium, or fee by any member of this society shall be sufficient cause for the expulsion of said member, by the vote of the society after conviction; and further be it

Resolved, That in case of co-operation in the care of a patient between a general practitioner and an orthodontist, there shall be no division of fees, but each man shall render a separate bill for his personal services.

This meeting was one of the stormiest that the Society ever encountered. The controversy was not so much over the resolution as over the matter of future members being specialists. The result was that most of the Angle graduates resigned, and they, in turn, organized the Alumni Society of the Angle School of Orthodontia.

ITEMS OF INTEREST

Apart from the multifarious activities of a person there usually can be found one that is his *opus fortis.* For Dr. Ottolengui this was *Items of Interest* (the word *Dental* was added in 1916). In 1896 he took over the editorship of that periodical, which was made up mainly of clipped items of interest.

Dr. Ottolengui immediately began to enlarge the number of pages and the format of the journal, so that it became a more attractive and artistic publication. It gradually began to command the attention of experienced writers. In contrast to the other dental journals, *Items of Interest* followed a policy of limiting society affiliations and reports of proceedings. Instead, the space was devoted to exclusive and original contributions rather than those prepared for presentation at society meetings.

Dr. Ottolengui, however, did make one exception and that was in favor of the American Society of Orthodontists. He also had sufficient foresight and understanding of the importance of the subject to give orthodontia a department of its own. *Items of Interest* was the first dental journal to do this. Today it is difficult to appreciate the importance of such an innovation.

In 1901, prior to membership in the American Society of Orthodontists, he published the papers read at that meeting. For some of his friends he had these bound into a single volume, which became volume I of the *Transactions.* I was fortunate to possess such a bound copy. At the 1903 session, the Society requested that, in addition to the papers, their proceedings be included, and Dr. Ottolengui continued to do this until 1916.

Dr. Ottolengui constantly went out of his way to stimulate, encourage, and establish new contacts. I first met him at the meeting of the Society in Denver in 1910. A few years later he asked if I would care to write a special paper for the orthodontic department of the journal. In 1914 I did send him the

paper on "Important Prenatal Factors . . ." and, much to my surprise and delight, he asked that he first be permitted to turn it over to the Program Committee and, if they showed an interest, then to include it in the 1915 meeting. This would permit a discussion and increase the value of the paper when published. Later I was to learn that he followed this procedure with other persons and in this way sent many an embryonic writer on his way to "fame and glory."

There are still some who will recall the Dewey-Ottolengui fight in 1915 for the right to publish the proceedings of the American Society of Orthodontists. There were those who felt that, with the establishing of the ***International Journal of Orthodontia,*** the time had arrived when the papers and proceedings of the society should be published in a strictly orthodontic journal. There were others mindful of what Dr. Ottolengui had accomplished in making orthodontics an important specialty in dentistry. It was a sad experience for Dr. Ottolengui to see how little the members of the Society appreciated his efforts on their behalf. However, he did continue the orthodontic department in *Items of Interest.*

Dr. Ottolengui was instrumental in bringing to the attention of the dental profession some of the most noteworthy pioneer contributions, and *Items of Interest* had the distinction of being the first dental journal to report many important new developments. In 1897 there was the announcement of the first radiographs, as well as reports on the experiments of Drs. McBriar, Kells, Van Woert, and Ottolengui. In 1899 Dr. William J. Morton's pressure anesthesia was reported, as well as the introduction of the word *prosthodontia* in place of "mechanical dentistry." In 1901, 1902, and 1903 came the serial publication of Dr. Hart J. Goslee on crown work, followed in 1904 by his "Principles and Practice of Crown and Bridge Work." In 1907 Dr. J. Q. Bryan's filling teeth with porcelain and Dr. Wm. H. Taggart's cast-gold inlays were reported. In 1908 came Dr. Ottolengui's effort on behalf of the American Dental Association, before the War Department, to grant rank to military surgeons. In 1909 the journal published Dr. Herman E. S. Chayes' paper on "The Problem of the Lower Extension Bridge and Its Solution," later followed by his "Movable-Removable Bridge." In 1911 Dr. Howard R. Raper's "Dental Radiography" and Dr. G. V. Black's "The Beginning of Pyorrhea Alveolaris" were published.

By 1917 Dr. Ottolengui had added to his laurels the publication of textbooks and treatises that have been of immeasurable aid to members of the dental profession.

THE AMERICAN ORTHODONTIST AND THE INTERNATIONAL JOURNAL OF ORTHODONTIA

> Nature is so varied in her manifestations and phenomena, and the difficulty of elucidating these causes is so great, that many must unite their knowledge and efforts.
>
> —*Marquis de Laplace.*

Much of the activities and development of early orthodontia have now become tradition. As mentioned previously, the split in the American Society

of Orthodontists in 1906 brought about the formation of the Angle Alumni Society. Dr. Dewey, in his presidential address, stated: "Up to within a very recent date orthodontists have been satisfied to have a very small space allotted to them at any dental meeting, and the cause of this is not far to seek. Orthodontia was not commanding of much respect as a science because it possessed so very little that was scientific."

Among the first steps that the Society took to correct this condition was the establishment of *The American Orthodontist*. Dr. Dewey edited volumes 1 and 2 and Dr. Milo Hellman edited volume 3. On the pages of that journal are to be found the early evidence of a change and of a new era in dental science. Therein were published such contributions as Dr. Fred Noyes' studies on embryology and Dr. Albin Oppenheim's reports on histologic experiments.

Upon the demise of *The American Orthodontist* in 1913, a new orthodontic journal began to be conceived, one that for more than forty-three years has played a most important part in molding the direction that orthodontics has taken.

In 1913 Dr. C. V. Mosby, who was then a newcomer in medical publications, while chatting with Dr. Charles Mayo, had his attention directed to what Dr. Mayo believed to be a coming new field in medicine and in dentistry, namely, orthodontics. This conversation and the possibilities that it suggested had such an enormous effect upon Dr. Mosby that he wrote to Dr. Angle that he was interested in starting a new journal and offered him the editorship. At that time Dr. Angle ignored the letter. This did not discourage Dr. Mosby, who then contacted Dr. Dewey. Learning of the latter's experience with *The American Orthodontist,* Dr. Mosby offered him the editorship and the task of starting the journal. The task assigned to Dr. Dewey was not an easy one, and it is doubtful that there was another person with the perseverance and the tenacity to overcome the many obstacles that were placed in the way of either man.

By October of 1917 Dr. Angle had changed his mind with respect to the journal and wrote Dr. Mosby suggesting a change of editors, offering him several names for his consideration. Dr. Mosby's letter of reply began, "Friendship and gratitude are of more importance and value than material success or commercial gain." Dr. Mosby refused Dr. Angle's cooperation under the conditions he mentioned; this later brought about the *Angle Orthodontist.*

Until his death Dr. Dewey retained the position of editor. When Dr. Dewey died Dr. H. C. Pollock assumed the duties and has ably and efficiently continued as editor ever since. From the beginning, the JOURNAL has presented the most complete record of orthodontic progress and development.

It was Dr. Mosby's wish "to bring together the different factions in this science to such a degree that all would work for a common aim, and that this aim would be the advancement of orthodontia as a science and as an art."

DENTAL COSMOS

Those men who had graduated from the Angle School of Orthodontia during the first decade of the present century found that orthodontia was developing

faster than they had anticipated and that an annual meeting of the Alumni Society was not sufficient to meet their needs. As a result, sectional groups were formed, some of which since have become component sections of the American Association of Orthodontists. The first of these groups was the Eastern Association founded in 1909; until 1939 it was among the most active of the orthodontic societies in this country. Until 1913 it was just another society, but that year the *Dental Cosmos*, through Dr. E. C. Kirk, offered to send a reporter, Dr. L. Pierce Anthony, to record the presentation of papers, discussions, and minutes.

As early as 1892 Dr. Kirk had contributed papers on the subject and, like Dr. Ottolengui, had the foresight to determine the direction and character of the development of orthodontia, that is, along scientific rather than so-called mechanical lines. Both men saw that it was through journalism that this could best be accomplished. As editors they were "the torch-bearer(s) of a wider knowledge, the aid to the teaching of a nobler science, and ever an inspiration to better practice."

Dr. Anthony stepped in where Dr. Kirk left off and continued until the problem of so-called "proprietary journalism" compelled the *Dental Cosmos* to discontinue first the discussions, then the minutes, and finally the papers. From that time the usefulness and value of our meetings and of other meetings were greatly impaired, and the loss to the dental profession was irreparable. Sixty of the last eighty papers read before the Society could not be published; many of them dealt with entirely new subjects. I, as well as others, believe that it was this situation that brought about the end of the Eastern Association.

THE ANGLE ORTHODONTIST

This journal was established by the co-workers of Edward H. Angle, in his memory, and is worthy of mention for the part that it has played in the development of the speciality in this country.

IMPORTANCE OF JOURNALISM

The publication of papers reflects a richness of tradition, a tenacity of purpose, and an epoch of history in which an important specialty was born and matured. More important is the fact that it was the means whereby the outstanding men in medicine and the allied professions became acquainted with orthodontics, its problems and its possibilities. They willingly accepted invitations to appear before our societies, knowing that their papers would be published. When their papers could not be published they were less eager to appear. These men covered a vast field of science and helped to advance the standards of orthodontics—so much so that the original nine or ten weeks of postgraduate training now has been extended to two or three years.

Subjects first discussed before orthodontic groups later found their way into dentistry. It was the beginning of orthodontic influence on allied fields, many of which showed the importance of these contacts in their own development. No one in anthropology had been concerned with the occlusion of teeth

and dentition of man and animals until orthodontics focused attention upon the subject. Other scientists became interested in the problems of growth and development, as well as other subjects too numerous to mention.

Last, but not the least, it was through journalism that orthodontics was able to find its way into the libraries of every important scientific organization. It was Dr. Ottolengui who, back in 1901, started orthodontic societies to have their own literature and to publish their transactions. Later, others cooperated to cause the flower to bloom.

B. W. Weinberger.

The Fifty-fourth Annual Meeting of the American Association of Orthodontists

THE GOLDEN ANNIVERSARY LUNCHEON OF THE AMERICAN ASSOCIATION OF ORTHODONTISTS

MONDAY, APRIL 28, 1958
COMMODORE HOTEL, NEW YORK

THE annual luncheon honoring the members of the American Association of Orthodontists who have been in practice for fifty years was once again an outstanding part of the A.A.O. convention. There were 323 in attendance to honor the sixteen members of the Golden Anniversary Group who were seated at the head table and also the members who were unable to attend the luncheon.

The presiding officer was the A.A.O. vice-president, Dr. George Siersma of Denver, Colorado. After a few very pertinent remarks, Dr. Siersma introduced Dr. Charles R. Baker, chairman of the Golden Anniversary Committee and an ardent and enthusiastic member of the Golden Anniversary Group. Dr. Baker welcomed six new members into the Group and stated that there are now forty-seven members, thirty of whom are still in active practice.

Dr. Hugh T. Berkey was unable to attend because he was being honored as the "Dentist of the Year" in Indiana at his state dental society meeting.

Dr. Baker then named the new members of this Group who had become eligible during the past year:

Perry B. Clark, Andover, Ohio
Joseph D. Eby, New York, New York
Arthur L. Morse, Boston Massachusetts
Joseph L. Selden, Louisville, Kentucky
Bernhard W. Weinberger, New York, New York
William W. Woodbury, Halifax, Nova Scotia, Canada

Drs. Eby and Morse were the only newly elected members who were able to attend the luncheon, but all of the others sent messages and greetings which were most interesting and greatly appreciated. Excerpts from these letters have been included in a report of the luncheon which Dr. Baker has sent to all members of the Group.

In reviewing the accomplishments of new members, it is most interesting to note what a great number of honored civil, dental, and military positions have been held by these men during their fifty years of dental and orthodontic

practices. Therefore, they must be honored not only for their fifty years in dentistry but also for their outstanding contributions to their professions and to their fellow men. These are accomplishments which we all admire and for which honor is deserved. It is interesting to note that all of these men practiced general dentistry for a period of one to seventeen years before going into orthodontics. This dental experience would be most valuable for all who contemplate entering a dental specialty, for it gives a broader view of the entire profession.

The audience rose in reverence for a moment when Dr. Baker read the names of six members of the Golden Anniversary Group who had died during the past year. We shall all miss seeing C. M. McCauley, Ralph Waldron, Orville Van Deusen, Walter C. Miner, E. Santley Butler, and Abram Hoffman.

Dr. Baker showed lantern slides of the new members and commented on their eligibility for membership, their hobbies, and their achievements in life.

A great deal is owed to Dr. Baker for his work as chairman of this Group for the past several years. His interest and time-consuming efforts are largely responsible for the great popularity of this luncheon of tribute to those who have done so much for their profession.

Dr. Siersma then resumed as presiding officer and introduced the speaker, Dr. Leuman M. Waugh. His introduction was received with delight, for he reviewed many of the speaker's outstanding accomplishments, such as his graduation from the University of Buffalo in 1900, his professorship there in histology and embryology, his move in 1914 to New York where he became a founder and professor of the Columbia University School of Dentistry and director of the orthodontic department, his development of the first movable x-ray unit suitable for the dental operating room, and his many writings on professional subjects as well as upon his unique investigation of diet and tooth decay of the primitive Eskimos. He then called on the speaker, who has received many honorary awards and has held the highest offices in many dental and other scientific organizations with which he has been affiliated.

Dr. Waugh's address was so outstanding and contained such a vast amount of valuable historical data that it is herewith published in its entire original form.

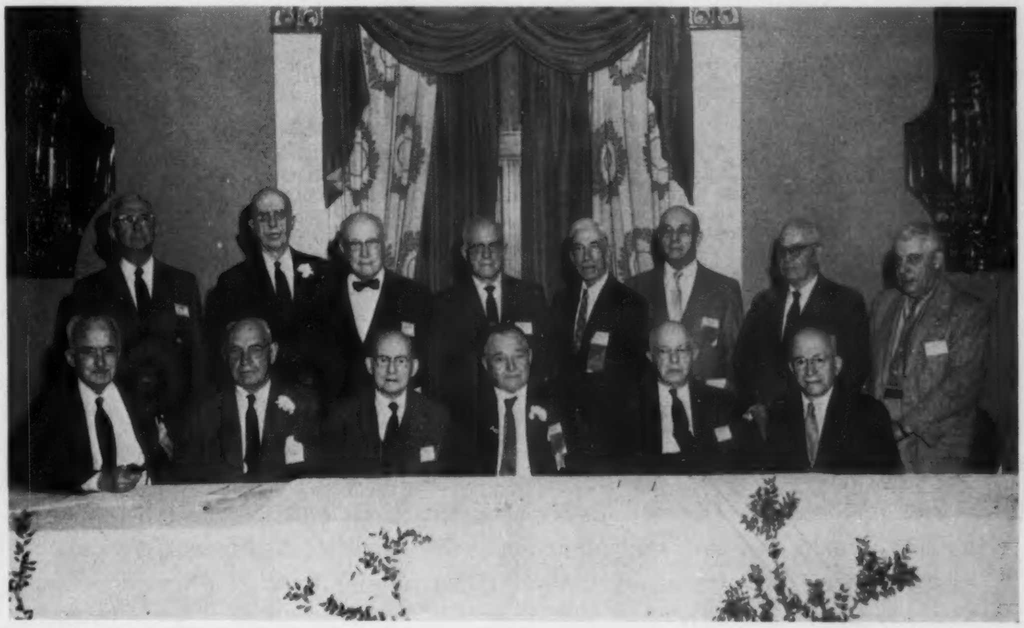
Lowrie J. Porter

GUIDANCE FOR TOMORROW'S PRACTICE GAINED FROM THE PIONEERS OF THE NORTHEASTERN DISTRICT

LEUMAN M. WAUGH, D.D.S., D.C.D., BETTERTON, MD.

As I look about me, I observe that I may be the ranking Golden Anniversary member present. When I realize that I am also the ranking past-president of the Dental Society of the State of New York and of the International Association for Dental Research and the ranking past-director of graduate departments of orthodontics under university discipline, I feel that I should do something about it, as I may be in danger of becoming altogether too rank!

We have gathered to pay honor to those of our specialty who were graduated in dentistry over a half-century ago. How long in looking ahead; how short in retrospect! Yet, there are those present who have lived and worked during the entire history of our quite young specialty; those who were friendly with Edward H. Angle, the first dentist in world history to limit his practice exclusively to orthodontics; and those who have enjoyed the rare privilege of personal acquaintance with practically all the pioneers who blazed the trail of our specialty. The feeling that information thus acquired should be written into the record was what prompted the choice of my title.



Golden Anniversary Luncheon, American Association of Orthodontists, Commodore Hotel, New York City, April 28, 1958.

Standing: W. H. Street, J. D. Eby, A. F. Jackson, W. E. Flesher, A. L. Morse, C. R. Baker, R. H. W. Strang, and S. J. Lewis.

Seated: W. H. Ellis, H. C. Pollock, Sr., A. M. Desnoes, L. M. Waugh, A. V. Greenstein, and S. W. Sheffield.

It might be well first to consider the boundaries of the Northeastern District. In the early period, it included the State of New York, the New England states, the adjacent provinces of Canada to the north, and the states to the south, including New Jersey, Pennsylvania, the District of Columbia, Delaware, Maryland, and Virginia. New York and Pennsylvania meet at Lake Erie to form the western limit. To the east lies the broad Atlantic, and for a few minutes, with your indulgence, I should like to span the miles eastward to ancient Greece where we find that the "straightening of teeth" was being practiced at about the time of the birth of Christ.

Twenty-four centuries ago Hippocrates (460-377 B.C.) wrote the first recorded statement pertaining to irregularities of the teeth. In his sixth book of *Epidemics,* he wrote: "Among those individuals whose heads are long shaped,

some have thick necks, strong members and bones; others have strongly arched palates, thus teeth are disposed to irregularity, crowding one on the other."

A method of treatment was first recorded by Celsus, a great Roman writer (25 B.C.-50 A.D.). He said: "If a second tooth should happen to grow in children before the first has fallen out, that which ought to be shed is to be drawn out and the new one pushed toward its place by means of the finger until it arrives at its just proportion." He said further: "When in a child a permanent tooth appears before the fall of the milk tooth, it is necessary . . . to extract it, and the other tooth must then be pushed, day by day . . . until it has reached its proper position."

The first mechanical treatment was suggested by Gaius Plinius Secundus (Pliny, 23-79 A.D.). He recommended filing elongated teeth to improve occlusion. Is equilibration really new?

John Hunter (1728-1793) was the first man in England to write at length on orthodontics. Three chapters of his *Natural History of Human Teeth* are devoted to irregularities of the teeth and their treatment.

In 1728 Pierre Fauchard of France, known as "the father of dentistry," published what may be regarded as one of the earliest attempts to offer a systematic method of treatment of malocclusion.

Joseph Fox wrote the first dental textbook in English in 1803; this was followed by a second edition in 1806. In these books he gave detailed directions for correcting irregularities of the teeth, and his method was used for nearly half a century.

Now we shall return from the Old World to our own country, entering it in the Northeastern District, for it was here that dentistry was introduced to the New World and here that orthodontics was cradled by the early pioneers.

At this time, treatment of irregularities of the teeth was considered a part of prosthetic dentistry and was dealt with as a mechanical art. Norman Kingsley (1850-1892)[1], a native of upper New York State who practiced in New York City, was very active in advocating the treatment of irregularities of the teeth and published much that was revolutionary and far in advance. Dr. Kingsley was known as "the father of orthodontia," and his textbook entitled *A Treatise on Oral Deformities as a Mechanical Branch of Dentistry,* written in the 1870's and published in 1880, remains a valuable record and reference today. It is replete with illustrations of orthodontic appliances of the period, including jackscrews, plain arches with ligatures, a counterpart of the so-called Hawley retainer, and also an appliance designed for space closures in extraction of maxillary first premolars. This text was regarded as the best to that date.

In 1888 John Nutting Farrar[2] of New York published the first book devoted entirely to orthodontics. Nine years later he published a second volume. These books were based upon the results of practical experience carefully recorded from 1863 to the time of publication. The two volumes, 1,570 pages with 1,400 pen-and-ink illustrations by the author, contained much that was epochmaking and afford profitable reading today for those devoting themselves to

orthodontics. Farrar was deeply interested in teaching others and was a visiting lecturer in orthodontics at the Baltimore College of Dental Surgery, the first dental school in America. His teaching did much to awaken interest in orthodontics among his undergraduate students and among practicing dentists.

Simeon H. Guilford[3] of Philadelphia, a member of the faculty of the Philadelphia Dental College, devoted considerable time to the practice of orthodontics. He also published a book, in 1889, entitled *Orthodontia.* This was followed by a second edition in 1893, a third in 1898, and a fourth in 1905. The first edition was written at the request of the National Association of Dental Faculties in furtherance of its plan to secure a series of textbooks for use in American dental schools. It was accepted and endorsed at the Association's meeting in 1889 and was the first textbook for dental students. Guilford advocated the use of fixed appliances and used a vulcanite bite plate to overcome excessive overbite.

Victor Hugo Jackson[4] of New York made his first presentation on correcting irregularities of the teeth in 1887, and many papers and clinics followed. At the University of Michigan and the University of Buffalo, where he was made professor of orthodontics, he lectured to the undergraduate dental students. He designed and championed a removable appliance, the "Jackson crib," which was friction-retained to the teeth and could be removed by the patient. To it were attached auxiliary springs for the movement of malposed teeth. These were the forerunners of many similarly designed springs attached to lingual and labial arches of the fixed type in use today. Jackson's book entitled *Orthodontics* was published in 1904; it contains 517 pages and 760 original illustrations and has been widely read.

Edward A. Bogue of New York was deeply interested in dentistry for children, and he made this his principal effort in practice. He studied early jaw growth and was one of the first in America, if not in the world, to practice correction of irregularities of deciduous teeth. Futhermore, he studiously measured progressive casts, gained considerable practical knowledge of growth, and applied this knowledge in his operative care of the teeth and in orthodontic treatment. Occlusion was of serious concern to him. On this subject, he collaborated with a neighboring colleague, Isaac B. Davenport, who had been engrossed for many years in a study of the factors constituting normal occlusion and who was belligerently opposed to the extraction of teeth to help relieve irregularities, a rather common practice of that period. Davenport staunchly advocated a full complement of teeth as being essential to most efficient occlusion.

About 1897 Dr. Bogue invited a small group of selected colleagues to his home to hear a paper on occlusion by Dr. Davenport. Dr. Edward H. Angle, who was present, was most impressed by Dr. Davenport's approach to the norm in occlusion. Angle often conferred with Davenport concerning his principles governing occlusion. It is noteworthy that, not long after the meeting at Dr. Bogue's home, Dr. Angle promulgated his classification of malocclusion in 1899 which continues to be the one most used at the present time. Dr. Bogue confided to me his conviction that Angle's concept of occlusion

and the inspiration for his classification of malocclusion stemmed from Dr. Davenport's well-illustrated paper. Dr. Bogue gave me a reprint, now rare, which I treasure highly. Dr. Harry E. Kelsey was associated with Dr. Bogue before he attended the Angle School in 1908.

Rodrigues Ottolengui[5] of New York became deeply interested in orthodontics about 1900. He contributed a paper to the program of the American Society of Orthodontists in 1902 and frequently thereafter. He was president of the Society in 1906, being the first president who had not been a student in the Angle School. His was the first meeting held in New York. Dr. Ottolengui took a keen interest in the advancement of the specialty and rendered an outstanding service in publishing the Society's proceedings in *Dental Items of Interest* of which he was editor. The text was excellently prepared, and the illustrations were generous and of unsurpassed quality. These proceedings were published continuously by him from the first meeting in 1901 to 1920. His assistance in shaping the programs of the Society was also of great value.

In the western part of New York, Mortimer L. Fay of Buffalo, about 1896, was the outstanding pioneer in mixed practice. He used Jackson cribs at that time, but later he employed newer methods as they were introduced. He was a fine operator, who produced satisfactory results. He also taught at the University of Buffalo, where he assisted Dr. V. H. Jackson.

In 1903 Leuman M. Waugh[6] of Buffalo, who had been a full-time teacher of histology, embryology, and later oral pathology at the University of Buffalo, opened an office to engage in mixed dental and orthodontic practice. He presented a paper entitled "The Laws of Antagonization of the Teeth in Orthodontia" at the ninth annual meeting of the American Society of Orthodontists in 1909. In 1914 he moved to New York City to limit his practice to orthodontics.

Harold M. Clapp of Utica, New York, a 1906 graduate of the Angle School, gave major attention to orthodontics but never fully limited his practice.

In Philadelphia, W. G. A. Bonwill practiced prosthodontia and orthodontics, as did N. S. Essig. In mixed practice there were Edwin T. Darby, L. Ashley Faught, G. L. I. Jamison, Edward C. Kirk, and Ambler Tees. Also in Philadelphia, I. N. Broomell[7] engaged in mixed practice. In 1898 he published his *Anatomy and Histology,* which was the first book written on dental histology. Pages 286 to 343 provided material on growth and development of the jaws and teeth which was most enlightening and helpful to the orthodontist. Philadelphia also had S. Merrill Weeks who was a pioneer in mixed practice before he limited his practice.

W. A. Magill of Erie, Pennslyvania, gave orthodontics the first plain anchor band, an indispensable part of all fixed appliances. Through his influence, his associates, Frank A. Gough and Frederick C. Kemple, studied with Dr. Angle in 1900.

In New Jersey, Chauncey Egel of Westfield and Charles A. Spahn of Newark were in mixed practice prior to 1910. Both later limited their practices. Dr. Spahn contributed much to orthodontic advancement in matters pertaining

to practice management and improved methods of treatment. He gave many clinics and read papers at various meetings. Later he served on committees and was the eleventh president of the Northeastern Society in 1931-1932 during which period several important changes were made in the By-laws. In his President's Address Dr. Spahn discussed a number of problems that arise during treatment and suggested solutions to promote better understanding among parents, dentists, physicians, and colleagues who refer patients for treatment. He was also active in and contributed importantly to the program of the First International Orthodontic Congress held in New York in 1931.

In Washington, D. C., the three pioneers in mixed practice before 1900 were Mark F. Finlay, M. O. Davis, and W. C. Killinger.

In Baltimore, Maryland, the chief influence for progress was John N. Farrar[2] of New York City who lectured at the Baltimore College of Dental Surgery. Foremost among those who felt his influence was T. S. Waters, who did good corrective work along with his general practice. Others engaged in mixed practice were Charles Harris, Isaac Davis, Marshall Smith, Eldridge Baskin, and M. B. Miller.

In the New England states, Henry Baker[3] of Boston was outstanding. His conception and development of the use of rubber bands to produce reciprocal intraoral traction for the movement of teeth and of jaw relations became known as the "Baker anchorage." This has been used by practically all orthodontists since earliest specialization and is still in common use. Every orthodontist is indebted to Henry Baker. Humanity was benefited because of him and he must ever be held in grateful remembrance. His son, Dr. Lawrence Baker, also engaged in mixed practice but later specialized. George Ainsworth was another who practiced general dentistry and orthodontics in Boston.

In Bridgeport, Connecticut, Alfred W. Fones and Clinton W. Strang pioneered in mixed practice before 1900. The latter was the father of Robert H. W. Strang, who undoubtedly was his principal contribution to orthodontic progress.

Outstanding among those in eastern Canada prior to 1900 was Hibbert Woodbury of Halifax, who wrote a thesis on orthodontia for graduation from the Philadelphia Dental College in 1877. He was the father of our fellow member, W. W. Woodbury, also of Halifax.

In the Province of New Brunswick, James W. Magee of St. John was recognized as the dentist most interested in orthodontics prior to and during the first decade of fully limited specialization.

On Prince Edward Island, J. S. Bagnall was one of the early pioneers in dentistry to do some orthodontic work.

In the Province of Quebec, Thomas L. Larseneur was the outstanding pioneer. He taught orthodontics at Laval University (now the University of Montreal) and personally fashioned his bands, tubes, and attachments from nickel silver. He is remembered as a true gentleman of the old school.

The pioneers who strictly limited their practices to orthodontics during the first decade (1900-1910) in the Northeastern District are as follows:

New York State

Rolf B. Stanley,[9] New York City—second dentist in the world and first in the Northeastern District (1903) to limit his practice to orthodontics

J. Lowe Young,[10] New York City—second (1904) in the Northeastern District to limit his practice to orthodontics

Frank A. Gough,[11] Brooklyn

Jane Bunker, New York City

Herbert A. Pullen,[12] Buffalo and Rochester—first in this section to limit his practice to orthodontics

Walter H. Ellis, Buffalo—second in this section to limit his practice to orthodontics

C. W. B. Wheeler, New York City

Frederick L. Stanton, New York City

George B. Palmer, New York City

Henry Clay Ferris,[13] New York City

Alfred M. Desnoes, New York City

Milo Hellman,[14] New York City

W. D. Riggs, New York City

G. A. Fletcher,[15] Albany

B. W. Weinberger, New York City

New England States

Alfred P. Rogers,[16] Fall River, Massachusetts (1903), Boston (1905)—first in New England to limit his practice to orthodontics

Norman D. Reoch, Boston, Massachusetts—died after a few years of practice

Albert W. Crosby,[17] New Haven, Connecticut

Robert H. W. Strang, Bridgeport, Connecticut

F. T. Murlless, Jr., Hartford, Connecticut

Ira B. Stilson, Providence, Rhode Island

A. LeRoy Johnson, Boston, Massachusetts

New Jersey

Ralph Waldron,[18] Newark—first in this state to limit his practice to orthodontics

Julius Minez, Upper Montclair

Pennsylvania

S. Merrill Weeks, Philadelphia—first in this city to limit his practice to orthodontics

D. Willard Flint, Pittsburgh—first (1903) in Pennsylvania to limit his practice to orthodontics

John V. Mershon[19]—second in Philadelphia to limit his practice to orthodontics

Samuel P. Cameron,[20] Philadelphia
James G. Lane, Philadelphia
Frederick R. Stathers, Philadelphia

Maryland

Harry E. Kelsey,[21] Baltimore—first in Maryland to limit his practice to orthodontics
Earl W. Swinehart, Baltimore—second in Maryland to limit his practice to orthodontics

Washington, D. C.

Charles A. Hawley[22]—the first and only one in the first decade to limit his practice in the District of Columbia

Canada

Arthur Roberts, Toronto—first (1904) in Canada to limit his practice to orthodontics
Guy Hume, Toronto—Angle School 1906; second in Canada to limit his practice to orthodontics
George W. Grieve,[23] Toronto—Angle School 1907; followed Dr. Hume by a few months
Charles Jouvet, Ottawa—limited practice in 1906, followed by Sydney Bradley, Ottawa
J. A. C. Hoggan,[24] Hamilton, Ontario, 1908 (moved to Richmond, Virginia, in 1912)
A. W. McClelland, Montreal, 1914—first in Province of Quebec to limit his practic to orthodontics; was Professor of Orthodontics at McGill University from 1924 to 1948
B. L. Himes, Montreal—second in Province of Quebec to specialize in orthodontics
Paul Geoffrion, Montreal—first French Canadian to limit his practice to orthodontics
William W. Woodbury, Halifax, N. S.—first in the Maritime Provinces to limit his practice to orthodontics; served as Professor of Orthodontics at Dalhousie University from 1910 to 1952 and as Dean of the Dental Faculty at Delhousie from 1935 to 1947

To point out in detail the contributions of the individual pioneers would make this paper too lengthy. (Much detailed information may be found in the accompanying references.) Instead, I shall allude to their contributions collectively.

First, may I emphasize that all, from Kingsley on, were aware of the need for increased knowledge of growth and development. For the programs of the American Society of Orthodontists, from the very first meeting in 1901, leading researchers and teachers in the basic biologic sciences were sought to present papers.

Recognition of the need for educational opportunities under university discipline stands out clearly because of the numerous papers on this subject contributed by many of the pioneers, including both those prior to 1900 and those in limited practice in the first decade.

The need for research pertaining to orthodontic practice is evidenced in the literature by the repeated efforts made to raise funds and to interest researchers. The caution practiced in the selection of students in the Angle School and of members for admission to the American Society of Orthodontists shows this. Emphasis was laid on the choice of *students* rather than those interested principally in technical skills.

The first sectional society in orthodontics was formed in New York City in 1908 by fourteen charter members, all Angle students. This was an important step forward and wielded a strong influence for the advancement of orthodontics, especially as a science. The maximum membership attained was sixty. It continued for thirty years until the reorganization of orthodontics on a national basis as the American Association of Orthodontists.[25]

Moving the Angle School to New London, Connecticut, in 1909, had a strong stimulating effect in the Northeastern section, particularly in emphasizing the scientific approach.

While the early authors and better thinkers stressed the importance of gross anatomy, embryology, histology, physiology, normal function, and proper nutrition, their knowledge was not well enough classified for much clinical application. Scientists presented masterful papers but, because of their lack of clinical knowledge, they were incapable of pointing to their direct practical application in diagnosis and treatment. Too, the orthodontists of that period were not well enough versed in the basic sciences to apply this to any great extent in everyday practice. How to move teeth was the immediate problem.

In order to evaluate the contributions of the early pioneers, one has to consider the state of orthodontics of over a half-century ago. At that time, the health service professions and, to an appreciable extent, the laity were questioning whether teeth could be safely moved to new positions. Would the pulps remain vital? Would the uncompleted roots of growing teeth be bent or would the apical ends be prevented from normal formation? Would the bony structure of the alveolar process be strong and would teeth moved by orthodontic means be retained as long? Would appliances not increase dental caries? Would irritation of gum margins during treatment not predispose to pyorrhea? Could orthodontic treatment be given without causing too great a physical or nervous strain on the child? Many dentists and physicians were skeptical, and the procedure was too new to permit of positive proof.

The pioneers of that uncertain era were truly the missionaries of orthodontics. Many were their problems and discouragements; they had to face a critical profession and a doubting public which had to be convinced of the practicability of orthodontic procedures by successful results in treatment.

A brief summary of some outstanding contributions of Northeastern pioneers follows:

Edward A. Bogue. First in the world to correct irregularities of the deciduous teeth

Isaac B. Davenport. Pioneered correct principles governing normal occlusion which provided the inspiration for the Angle classification of malocclusion

J. Lowe Young. The "Abe Lincoln of orthodontics"; dynamic in impressing dentists with the importance of orthodontics; active in organization work; co-founder and first president of the Northeastern Society

Frank A. Gough. Co-founder and first president of the Eastern Association of Graduates of the Angle School of Orthodontia

Herbert A. Pullen. Author, Professor of Orthodontics at the University of Buffalo, first orthodontist in western part of New York State

Walter H. Ellis. Graduate of the University of Buffalo in 1903 and of the Angle School in 1904; promptly limited his practice, being the second to do so in western New York, and has been continuously active in the advancement of dentistry and orthodontics; the senior past president of the Eighth (N. Y.) District Dental Society; served the American Association of Orthodontists as Secretary from 1923 to 1926 and as President in 1928; for twenty years has given much time and thought to the team approach for the rehabilitation of the cleft palate child; was a co-founder of the Cleft Palate Clinic at the Buffalo Children's Hospital and the founder of the Department of Orthodontics at this institution, serving as its Chief; was appointed by the Department of Health of the State of New York as Chairman of the Subcommittee for the Western District of the Orthodontic Advisory Committee by which underprivileged children are given orthodontic care under State aid; the senior practicing orthodontist in the Northeastern District and the second in the world; in 1953 was awarded a citation by the University of Buffalo in recognition of outstanding ability and distinguished accomplishments in the field of dentistry, and has been elected to its Council over a period of sixteen years

Milo Hellman. World renowned for his research in dentition and growth

Alfred P. Rogers. Originator of myofunctional therapy in orthodontics

A. LeRoy Johnson. Pioneer of the concept of the individual normal in occlusion

Robert H. W. Strang. Author of four editions; persistently active in teaching

Ralph Waldron. Professor of Orthodontics at New York University; brought Paul Simon to America as an essayist when he served as President of the American Society of Orthodontists in 1924

John V. Mershon. Creator of the removable lingual arch and treatment philosophy; pioneer in the biologic approach to treatment

Charles A. Hawley. Contributed standard arch forms and introduced the removable vulcanite plate as a means of retention

George W. Grieve. Pioneer in the removal of premolars and space closure

B. W. Weinberger. Foremost historian; Brash credits him with introducing the idea of prenatal influences; was the first orthodontist to bring attention to the writings of Jansen; is a devotee of the biologic approach

I am particularly anxious to bring to your attention certain personalities of the early days who were outstanding in the creation and advancement of orthodontics as a distinct specialty. Their names and works belong to history, and some of them must never be forgotten. No group has ever worked with truer devotion and greater zeal, and we of today must record our deep appreciation and abiding gratitude to be passed on to posterity.

From the men previously mentioned, we learned the following:

1. Normal occlusion is the basis of the practice of dentistry.

2. Most efficient occlusion demands that in closure the inclined planes of the teeth are under proper influence to direct them to a definite and positive resting place. Only thus is masticating efficiency maintained for the greatest number of years.

3. The *development* of individual normal occlusion is the basis of the practice of orthodontics.

4. It is the duty of the general practitioner to maintain efficient occlusion developed by orthodontic correction. It is also his duty to recognize early in his child patient those factors which predispose to malocclusion and recommend that they be given prompt attention.

5. The work of the pedodontist is most important at this time.

6. The periodontist is principally responsible for the maintenance of the health of the supporting structures of the teeth in the adult.

7. The best service for humanity will result only from intelligent, cordial, and sympathetic cooperation of all concerned in dental health as a *team* service.

Normal occlusion should be the visualized ideal of all dentistry and should be the objective for which we all strive. There are conditions, however, quite beyond the control of the orthodontist and the dentist, which compel the modification of the ideal. In such conditions, the guide must be the slogan "Strive for the ideal; compromise for the practical."

Every possible effort should be made to produce normal individual occlusion with a full complement of teeth. Every known principle underlying normal growth and development should be attained whenever possible, but we must bear in mind that there is a limit to the heredity, the environment, and the economic

status of many patients. Here a compromise is the wise and practical solution if the benefit of orthodontics is eventually to be made possible for all who need and earnestly seek it. Nothing less, I dare say, would satisfy our devoted pioneer forefathers.

Even though much had been contributed from basic science, it remained for T. Wingate Todd[26] to provide a biologic handle which we could grasp and apply directly in the clinical approach to diagnosis and treatment. This was introduced in his paper entitled "Integral Growth of the Face," which was presented at the thirty-third annual meeting of the American Association of Orthodontists in New York. B. Holly Broadbent, Dr. Todd's associate in research, discussed the paper. Here for the first time was a team—anthropologist and orthodontist—working together. Todd said, in part: "The records of our long term studies on children now include standard Bolton x-ray pictures and records over a period of five years. It is perfectly possible therefore to construct norms of facial growth at any period of childhood, and it is likewise possible to study both the origin and the course of deviations from the norm." He further said:

"I am altogether indebted to my colleague, Dr. B. Holly Broadbent, whose patient devotion to the scientific side of orthodontia was rewarded by the establishment of the Bolton study and whose technical skill and meticulous precision made possible the roentgenographic cephalometer, by which determinations of form and growth in the face can be made with accuracy and confidence."

Todd pointed out that there are four principal periods of accelerated horizontal jaw growth:

I. The *first* and the most rapid of any time in life is from the twenty-first day after birth to the seventh month.

II. The *second* most rapid is from the fourth to the seventh year.

III. The *third* period is from the eleventh to the thirteenth year.

IV. The *fourth* is from the sixteenth to the nineteenth year.

In the *first* period, the urge stimulating rapid growth from the twenty-first day to the seventh month is due to the fact that the crowns of the deciduous teeth had all attained their full breadth before birth; hence, the need for rapid jaw growth as their follicles move into alignment in the jaws during the first year. The temporomaxillary region is fast changing and the direction of growth is stimulated mostly by the gymnastics of nursing, the mandible having to be moved forward in natural suckling. Artificial nipples should closely resemble the natural one in size and form to compel similar activity in function. This, we believe, is the most important factor in preventing formation of Class II malocclusions.

Growth during the *second* period—the fourth to the seventh year—is due to the alignment and eruption of the permanent incisors, cuspids, and the permanent first molars within their crypts in the jaws preparatory to eruption.

The natural urge of growing and erupting teeth is the strongest influence in the growth of jaw to sufficient size for the accommodation of all of the teeth, and outside interference should be studiously avoided.

In the *third* most active period—the eleventh to the thirteenth year—the growth takes place in the buccal region, largely distal to the permanent first molar, for the accommodation of the second permanent molars. The premolars are in process of eruption and root growth and should not be surgically interfered with until after this time (the thirteenth to the fifteenth year) so as to allow Nature to contribute her full measure to jaw size. Extraction of premolars much prior to this time is contraindicated, for it interferes with Nature's urge. Often borderline cases adjust themselves almost automatically and there is developed sufficient jaw area in the buccal sectors to accommodate them in efficient occlusion.

In the *fourth* and last period—the sixteenth to the nineteenth year—growth is distal to the second molars, principally to provide jaw area for the third molars.

Proper appraisal of the tempo of growth is the orthodontist's most important problem, and experience in observation is the essential guiding factor. The tempo of growth, as recorded and reported by Todd, has been of utmost practical help to me for over twenty years and has prevented much destruction of alveolar process due to uncalled-for extractions. In my practice of over forty years, the percentage of extractions as a therapeutic measure in treatment has been about 12 per cent; one third of these extractions consisted of the removal of one lower incisor. I prepared a chart,[27] soon after hearing Todd's paper, to help visualize his teaching. This has been found to be most helpful in teaching students and in informing parents of prospective patients of the aim and the limit of orthodontic treatment.

In the intervening periods, growth takes place mostly in a vertical direction.

One of Todd's loyal students, Dr. W. M. Krogman, an honorary and yet active member of the Northeastern Society, has been continuing a study of child growth at the University of Pennsylvania. He presented a masterful paper, entitled "An Evaluation of the Principles of Growth as They Apply to Orthodontics" before the A.A.O. in 1954. He is preparing additional "norms" for guidance in clinical orthodontics which will be of further help. To me, this approach is the most important and promising path for *guidance in tomorrow's practice.*

May I suggest, therefore, that the advocates of early surgery and mechanical heroics substitute the principles of growth and conscientiously endeavor to synchronize treatment with the tempo of growth to help Nature attain her full potential before deciding to extract. I firmly believe that, by so doing, orthodontists will find the very best help for tomorrow's practice, keeping always in mind the guiding principle stressed by John Mershon to his students: "You may move teeth to where you think they belong but Nature (function) will place them where they will best be adapted to the rest of the organism."

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Message from Lloyd S. Lourie:

"It would be a pleasure to renew my acquaintance with you and with many of my old friends in the American Association of Orthodontists but I shall have to give it up for another year at least. Please give my kind regards to all who remember me. I wish you a successful meeting and many enjoyable reunions."

Message from Frank M. Casto:

"One of the most essential factors in the guidance of the orthodontist of tomorrow is a rigid adherence to an exalted ideal: the establishment of normal occlusion. Only thus can the highest professional standards and objectives be achieved.

"With the advent of Dr. Edward H. Angle into the field of orthodontics, a new and lasting fundamental concept was born. Chaos in diagnosis and treatment was replaced by

an intelligent, orderly, and simplified method of procedure. In this new concept the conservation of all normal anatomical structures was particularly emphasized. The appliances used in treatment were tremendously reduced in number and greatly simplified, more dependable in stability, direct action, and efficiency.

"The great advancement, subsequently, in the field of orthodontics has been based primarily upon these enunciated principles: principles which have proved of inestimable worth. Therefore my advice to the orthodontist of tomorrow is to inculcate these fundamental principles and high ideals in his professional practice.

" 'In art, in everything, the one supreme principle is simplicity.' "

Message from Alfred P. Rogers:

LOOKING AHEAD

"Looking into the future, and at the same time seeking for a measure of guidance from those who have had long and valuable experiences, for the purpose of better understanding in orthodontic practice, is a wise and, I think, promising undertaking.

"After more than half a century of active participation in orthodontics I am, at this stage of my development, severely critical of trends in practice in recent years. I am sorely disappointed and apprehensive because of the fact that much clinical work today is not based upon a clear and definite understanding of the laws of growth and development. Instead of learning to combat the ill effects of malnutrition and the curtailment of function in the development of our children, men seem to be bewildered and frustrated in their attempts at prevention and correction of malocclusion. Therefore, I think that in the future strict attention must be paid to the growing child and those influences which have a tendency to produce proper oral and facial development. The biochemist who is working in the nutritional field should be accepted as one of our most valuable teachers in understanding the basic ideas of human nutrition. With this instruction men should learn through a deeper study of anatomy and physiology the role of functional activity in its influence on facial form and, coupled with these studies, a deeper interest in child psychology. Such measures would place the orthodontist upon a more scientific and promising field of endeavor."

Message from B. E. Lischer:

BEYOND TECHNIQUE

"Sixty years ago, during my junior year in dental college, instruction in orthodontics was limited to the technical methods of mechano-therapy for so-called 'irregularities of the teeth.' Nearly all of the important advances of orthodontics have been achieved since then. Not the least of these progressive steps has been the acceptance of dental education as a *university discipline.*

"Dental colleges have become Schools of Dentistry in accordance with university standards of evaluation and terminology. Admission requirements have been raised; the curriculum has been broadened and better balanced; the basic sciences of dentistry are taught more adequately and are being integrated with clinical dentistry. The dental student of today can now acquire his most essential accomplishment—an *understanding of scientific method.* In brief, dentistry is not only regarded as a profession, but it has achieved graduate status in academe.

"In finding their place in the modern world universities had to cope with numerous difficulties and make many basic adjustments. Procuring adequate financial support, adapting their ideals of purpose to contemporary needs, and trying to remain a constructive force in a social order that frequently ignores excellence of achievement have always been bothersome problems. Extending the frontiers of knowledge when vested interests were antagonistic and serving a public which was easily influenced by utilitarian aims are two few examples of the troublesome matters which had to be dealt with as universities struggled to establish themselves as 'associations of scholars.' It took several decades to consecrate themselves to

the ideal that they are justified to take into their jurisdiction all subjects that require scientific analysis and exposition, especially if such treatment will provide solutions of fundamental social needs.

"Dentistry, in all its branches, now supplies an essential health service, and dental schools have reached a higher status in the academic world. Nevertheless, we have not reached finality in orthodontic education and much remains to be accomplished. Our better understanding of the nature of our problems has confirmed our conviction that many of our difficulties lie beyond the realm of our intricate technique.

"An obligation remains: that we continue to support universities in their efforts to safeguard the education and training of dentists against trade-school methods and points of view, that we help them to expose the exploitation of cheap and shoddy methods of training and instruction which are unworthy of a profession.

"After all, old systems of appliances and schools of thought are now regarded as mere assemblies of minor talents, based on necessary but bare technique. We can no longer afford to believe in their all-inclusive efficiency. Such limited concepts of our educational problems should no longer inhibit our progress and growth.

"It is my conviction that the American Association of Orthodontists should continue as a responsible organization for maintaining high standards of excellence and scientific integrity for the education and training of our successors."

*Message from Oliver Wilson White:**

"I welcome the opportunity to express my personal appreciation along with my fellow past-presidents', to all who contributed to the growth of our society during the first twenty years.

"I especially wish to pay tribute to our first past-presidents, Edward H. Angle (1901), Milton T. Watson (1902), and Lloyd Lourie (1903). To these three gentlemen, our society will be forever indebted for their valuable advice and personal efforts in piloting our society during its organization and the first three important years of its existence. They are the Fathers of our organization."

Credit is gratefully acknowledged to the following for furnishing information relative to the respective area in which each practices:

1. George M. Anderson, Maryland and Virginia
2. Fred R. Blumenthal, Boston, Mass.
3. Sydney W. Bradley, Ottawa, Canada
4. Joseph D. Eby, New York, N. Y.
5. Walter H. Ellis, Buffalo, N. Y.
6. B. Edwin Erikson, District of Columbia
7. G. Vernon Fisk, Toronto, Canada
8. Gerald Franklin, Montreal, Canada
9. Paul Geoffrion, Montreal, Canada
10. William R. Joule, New Jersey
11. Richard A. Lowry, New Jersey
12. Alfred P. Rogers, Massachusetts
13. John W. Ross, Pennsylvania
14. Frederick R. Stathers, Pennsylvania
15. Robert H. W. Strang, Connecticut
16. Raymond L. Webster, Providence, R. I.
17. B. W. Weinberger, New York, N. Y.
18. William W. Woodbury, Maritime Provinces, Canada

*Dr. White was introduced as our senior orthodontic specialist. He has been in limited practice for fifty-four years and is still going strong.

Editorials

The Jenkins-Keogh bill is so important to the future that the editor asked Dr. Charles H. Patton, an orthodontist and a trustee of the American Dental Association, to write a guest editorial on this subject so that the readers of the *American Journal of Orthodontics* may be brought up to date on this very important bit of proposed legislation.

THE JENKINS-KEOGH BILL

"OUR OPPORTUNITY"

THE Jenkins-Keogh bill (H. R. 9 and 10) would allow dentists and other self-employed persons to make income tax deductions of limited amounts paid into a retirement program. It is a tax savings plan as well as a method of encouraging self-employed persons to put away money for their later years. As presently written, the bill would permit a dentist or other self-employed person to deduct from gross income each year 10 per cent of net earnings up to a maximum of \$5,000.00. Over a person's lifetime as much as \$100,000.00 could be set aside and deducted. A special provision of the bill would allow persons over 50 years of age to set aside and deduct additional amounts. A five-year carry-over provision is included to permit increased deductions in years of high productivity. The retirement program could be set up either through an insurance company or through a trust fund arrangement with a bank or trust company. Under the insurance method, most existing policies could be converted or adjusted to accommodate the retirement program.

The bill contains a special formula for lower than ordinary tax rates on lump sum distributions from a retirement after age 65. There is a concomitant provision for a tax penalty on distribution prior to age 65.

Those, in brief summary, are the main points of the current bill. Its advantages are quite obvious. It permits a person to defer payment of taxes from periods of high income to a later time when, in the normal course of events, he will be in a lower tax bracket.

To illustrate the immediate benefits to be derived, take the case of a practicing dentist who has \$1,000.00 before taxes, for the purchase of a retirement annuity. Assuming that he is in the 30 per cent bracket, he could, under the Jenkins-Keogh bill, save \$300.00 in taxes. Put another way, he could buy insurance worth a full \$1,000.00 instead of only \$700.00.

All members of the dental profession, as well as other self-employed persons, could enhance the bill's chances by making their views known immediately to

their Representatives and Senators. This united effort will create an awareness in Congress of the widespread support for this legislation which exists in all Congressional districts.

In reading the June, 1958, issue of the *Journal of the American Dental Association,* I was interested in the first article, entitled "Dentistry in 1967—A Symposium." The combined papers provided a fascinating prognostication and an intelligent perspective of the nation's dental needs, demands, and services in the years that lie ahead. A better understanding of what tomorrow's public will expect of the dental profession will enable the profession and each of its members to meet those challenges more effectively.

This survey of the future is essential and important, but there is another phase of our professional life that has been taken for granted, ignored, or simply met with indifference. I am referring to our own security and interest in protecting our future. It is very important to see that certain tax inequities are corrected. The American Dental Association is doing its utmost to promote favorable legislation in the correction of these faults. This is not enough; every member of our profession should assume his share of this responsibility.

Since its inception, the Internal Revenue Code has, in its original adoption, been unfair to self-employed individuals. This is fundamentally wrong, and it is high time that those of us who are affected should take measures to correct this error.

Employee retirement pension funds have had an astounding growth in the United States since 1942 when the government supplemented the Social Security Act to encourage corporations and their employers to set up pension funds under preferential tax treatment. The Code was amended in 1954 but did not give any consideration to the self-employed. Our present tax law still discriminates against the self-employed taxpayer in favor of the employee who is given a tax-free retirement plan by his employer. As the result of this, 10,000,000 owners of small businesses, physicians, dentists, attorneys, accountants, farmers, and others experience an economic injustice.

Canada and Great Britain have passed favorable legislative measures that equalize the tax burden. It seems to me that our profession, along with others that are similarly affected, should endeavor at once to use proper measures to secure a just tax settlement. The American Dental Association is working strenuously on this problem. The A.D.A. is a member of the American Thrift Assembly, an organization composed of associations of the self-employed. This latter group is using every effort to induce Congress to consider favorably their proposals for a change in the present tax laws.

Charles H. Patton

1702 Locust St., Philadelphia, Pa.

ATTENTION, DENTISTS!

YOUR ATTENTION, PLEASE! This alert is very important to all self-employed persons, such as dentists, physicians, lawyers, and farmers. Dentists, of course, for the most part, are self-employed. If you are a dentist,

you have not been eligible for pension plans enjoyed by employees, and that places you at a considerable disadvantage in making plans for your future whenever you are retired, willingly or unwillingly. Now you may be able to help remedy that inequality if you are willing to get in there and pitch.

A bill has been introduced in the current Congress. It is known as the Jenkins-Keogh bill (H. R. 9 and H. R. 10).

The purpose of the bill is to equalize pension plans of self-employed and corporate-employed persons. It would encourage the setting-up of voluntary pension plans by the self-employed.

The self-employed would be allowed a deduction for Federal income tax purposes of amounts set aside for their retirement. The tax deduction could not exceed the lesser of 10 per cent of self-employment income or $5,000.00. However, special leeway would be given to persons aged 50 years or more because they do not have too much time to build up a retirement fund. For them, the allowable tax deduction would be increased one-tenth for each year of age over 50. There are many other good points also.

The bill will place self-employed persons on an equal footing with employees of corporations who are under a pension plan. Especially would the bill prove beneficial to those self-employed persons in the higher income brackets.

Also it would especially benefit persons who have only eight or ten years of active service left before retiring. For instance, a person 60 years old, who might be earning $51,000.00 of taxable funds per year, could deposit $10,000.00 per year before calculating his tax bracket, which, in effect, would mean that the Government would be putting up more than half of that sum.

The Jenkins-Keogh bill is one of the most important things that have come up for the benefit of self-employed persons in the current era. If you agree, please do not wait. Please remove your white coat and write to your Senators and Congressmen and let them know your views. If you do not know their names and addresses, the secretary of your state dental society will no doubt be glad to provide you with a list.

Set aside an hour (by appointment) to attend to this bit of correspondence. It is very important to put professional men on a par with other brackets of society in bringing about equality in retirement opportunity.

H. C. P.

AN ANSWER TO "HOW MUCH ORTHODONTICS SHALL THE PEDODONTIST DO?"

THE question propounded here is discussed in the report of a study group of the American Academy of Pedodontics in the *Journal of Dentistry for Children.**

The study group answers its own question when it states: "If he [the pedodontist or general practitioner] is informed and experienced in growth and

*Brown, W. E., et al.: How Much Orthodontics Shall the Pedodontist Do? J. Dent. Children 25: 3-8, 1958.

development, etiology, diagnosis, and the treatment of malocclusion, the total care of a patient's oral health may be accomplished by one general practitioner." To the foregoing we say "Amen."

It is in order, however, to analyze the statement further, especially since the study group presents an outline of *types of malocclusion which could be treated by the pedodontist* in contradistinction to those which should be referred to the orthodontist.

It should be pointed out that, in order to be "informed and experienced" in the various phases of diagnosis and treatment of malocclusion, the pedodontist would have to obtain a graduate course in orthodontics. Since the present undergraduate dental curriculum, unless it is especially curtailed, is already too crowded, and the undergraduate dental student is hardly ready to pursue a course in orthodontics on the graduate level, we do not know where the study group expects the pedodontist to obtain the training and experience which it considers essential. If the dental colleges were to curtail their present curriculums to include such a course as is advocated by the pedodontic study group, the present manpower shortage in dentistry would be further aggravated, and the profession is now not keeping up with the annual increase in population. Furthermore, most of those who take graduate courses in orthodontics tend to limit their practice and leave the field of general practice or pedodontics altogether.

The outline presented by the study group of the American Academy of Pedodontics differentiates among the following types of malocclusion:

1. "Functional malocclusions are produced by cuspal interferences, habits, or by other conditions.
2. "Skeletal malocclusions are produced by disturbances of bony growth.
3. "Dental malocclusions are produced by the malposition of teeth, such as those by malposed individual teeth, by early loss of teeth, or by other conditions."

The term *malocclusion,* as we understand it, refers to malrelation of the teeth when the upper and lower dental arches are in centric occlusion and to irregularities in the respective dental arches. Malocclusion can be said to be present also in arches with well-aligned teeth when the accepted dental formula and interarch occlusion are disturbed.

Functional malocclusion which involves muscle malfunction rarely, if ever, is confined to the teeth alone and practically always involves disturbances of bone, even if it is confined to the alveolar bone only. As we have pointed out elsewhere,* the alveolar process is the "slave" of the teeth; where the teeth go, the alveolar process follows.

Treatment of anterior and posterior cross-bites, call them what you will, requires fine diagnostic judgment to determine where the fault lies.

*Salzmann, J. A.: Orthodontics: Principles and Prevention, Philadelphia, 1957, J. B. Lippincott Company, chap. 10.

We do not understand the differentiation made by the study group between distoclusion and Class II relationship. We do know that distoclusion is a feature of Angle Class II malocclusion. Orthodontists have described six types of Class II (Angle) malocclusion. The treatment of this classification of malocclusion requires clinical training and clinical experience.

The description of mesioclusion in the outline omits much that is to be desired. In New York City one woman is making a crusade on treatment of lingually occluding maxillary incisors by means of a tongue blade. She has formed an organization of lay people and is undertaking to give advice not only on the "tongue blade" treatment but on all phases of malocclusion. Some of the proponents of extraoral therapy (or is that the wrong term?) are now claiming to treat all forms of malocclusion by means of this "system." In many cases the diagnosis of Class III (Angle) malocclusion is far from being just a matter of looking at the plaster casts. There are other points in the outline that would bear clarification.

There is no questioning the fact that the pedodontist should possess a deep understanding of orthodontic problems as they occur in his patients. There is great need also for a more sympathetic and practical understanding of the pedodontist's problem on the part of the orthodontic specialist. The danger to the patient lies in the treatment of children by the pedodontist and general practitioner who feels that he has a "right" to practice orthodontics without the preparation advised by the study group. Evidence of this danger is already well known to orthodontists who are now receiving into their practices an increasing number of children whose malocclusions had been "treated" elsewhere.

The pedodontist can make important contributions to the prevention of malocclusion, to the maintenance and guidance of the developing dentition of the child, and even to the treatment of incipient conditions. However, there is a great need for further cooperative study between pedodontists and orthodontists. We do not think that a definitive answer is available at present on this subject; nor is it contained in the outline presented by the study group.

The question has been asked: "What is the difference between a *major* and a *minor* surgical operation?" The answer given is that a major surgeon makes a major operation a minor one, while a minor surgeon makes a minor operation a major operation. There is great need for an increasing number of major operators in orthodontics. We believe that, while the underlying philosophy of the study group is valid, the outline as it now stands requires much additional study.

It would be an act of supererogation, if not downright self-seeking, for orthodontists to insist that the treatment of malocclusion be done by orthodontic specialists only. It is their duty to the public and to the child population, however, to point out the dangers attending the practice of orthodontics by those not qualified to do so. In this we are in full agreement with all practicing dentists.

J. A. S.

In Memoriam

John T. Fleming
1906-1957

JOHN T. FLEMING of Nichols, Connecticut, died on Nov. 27, 1957. He was born in New Haven, Connecticut, on Nov. 12, 1906.

He was graduated from the Hillhouse High School, Lehigh University, and Tufts College of Dentistry. He was graduated from the Dewey School of Orthodontia and also did graduate work at Columbia University. He was a member of the Psi Omega fraternity.

Dr. Fleming was a member of the New England Dental Society, the Connecticut State Dental Association, and the Bridgeport Dental Association (past-president). He was also a member of the Northeastern Society of Orthodontists, the American Association of Orthodontists, and International Association of Anesthesiologists. He belonged to the Algonquin Club and the University Club of Boston.

Dr. Fleming was secretary of the Trumbull, Connecticut, Zoning Commission, a member of the Democratic Town Committee, and orthodontic consultant on the Staff of St. Vincent's Hospital.

Dr. Fleming was an avid gardener and excelled in baseball in high school and college.

Surviving are his widow, Hilda M. Fleming, five daughters, and three sons.

BE IT RESOLVED that this Society place these resolutions on record and that an appropriate message of sympathy be sent to Mrs. Fleming and her family.

John H. Madden
Medical Arts Bldg.
Staten Island, New York

E. Santley Butler
1868-1958

E. SANTLEY BUTLER of 49 Neptune Ave., New Rochelle, New York, died on Jan. 20, 1958, after a long illness. He was 90 years of age. A dentist, he practiced here since 1892.

A native of Berkenhead, England, Dr. Butler was born on Jan. 3, 1868, the son of the late Edwin and Elizabeth Abbott Butler.

Since 1911 Dr. Butler had specialized in orthodontics. His office was at 55 Locust Ave.

Dr. Butler was a former president of the New York Society of Orthodontists. He belonged also to the First District Dental Society, the New York State Dental Society, and the American Dental Association. He was a member of Trinity Episcopal Church.

He was graduated in 1892 from the New York College of Dentistry, where he was a member of Omega Kappa Upsilon Dental fraternity, and in 1911 from the Angle School of Orthodontia. He was past-president of the Eastern Society of Graduates of the latter school.

Dr. Butler also held membership in the Hugenot Lodge 46, Westchester-Putnam District, of Free and Accepted Masons and Bethlehem Commandry 53 of the Knights Templar. He was a life member of the Royal Arch Masons 228.

In addition to his wife, the former Susan Bands, Dr. Butler leaves a son, Edward I. Butler of New Rochelle; three daughters, Mrs. Herbert Forrest of New York City, Mrs. Calvin E. Scofield, and Miss Elizabeth Butler, both of New Rochelle; a brother, John F. Butler of Bronxville; seven grandchildren; and nineteen greatgrandchildren.

BE IT RESOLVED that this Society place these resolutions on record and that an appropriate message of sympathy be sent to Mrs. Butler and her family.

John H. Madden
Medical Arts Bldg.
Staten Island, New York

Eugene John Kelly
1904-1957

THE members of the Northeastern Society of Orthodontists learned with deep regret of the sudden passing from their ranks of their past-president, Eugene J. Kelly, of Trenton, New Jersey, one of the active and most energetic workers of our profession. Dr. Kelly's sudden death on Aug. 19, 1957, was a great shock to his many friends and acquaintances.

Born on April 10, 1904, in Trenton N. J., he was the son of Mr. and Mrs. John P. Kelly. In 1928, upon graduation from the University of Pennsylvania Dental College, Dr. Kelly began his orthodontic career under the preceptorship of Dr. Ralph Waldron of Newark New Jersey, and remained until 1931, at which time he started his orthodontic practice in Trenton. He was a most active worker in organized dentistry in his community during his professional life.

Dr. Kelly was past-president of Mercer County Dental Society; he was a member of the New Jersey State Society, Rotary Club of Trenton, Trenton Knights of Columbus, and the Burrough Council of Yardley, Pa.

Dr. Kelly was an avid fisherman and duck hunter, and he enjoyed sailing. He was Past Commodore of the Brant Beach Yacht Club. He was a member of Black Rock Gun Club and Ducks Unlimited, Inc.

Gene Kelly's orothodontic activities were not confined to his state. He was a diplomate of the American Board of Orthodontics; a member of the American Association of Orthodontics and of the eastern component of the Edward H. Angle Society, where he was serving as chairman of the Membership Committee at the time of his death. He was a Fellow of the American College of Dentists, a member of the Tweed foundation, the Tweed Seminar of 1947, Strang Tweed Group, and the Philadelphia Orthodontic Society. He was on the Faculty of the Columbia University Dental School.

Surviving are his widow, Edna Hill Kelly, and four sons—John who is serving with the Navy, Eugene, Jr., William and Thomas. A brother, John F. Kelly of Trenton, New Jersey, also survives.

BE IT RESOLVED that this Society place on record its appreciation of his services and express its sorrow in the great loss sustained, and be it further *RESOLVED* that a copy of these resolutions be forwarded to the bereaved family as evidence of our sympathy and that a copy be spread in the minutes of our Society.

John H. Madden
Medical Arts Bldg.
Staten Island, New York

Stephen Girard Lee, Jr.
1907-1957

STEPHEN G. LEE, JR., of 19 Western Dr., Short Hills, New Jersey, died of a heart attack on May 8, 1957, while visiting in Point Pleasant Beach. He was 50 years old.

Born on April 8, 1907, in East Orange, he was the son of Mrs. Laura P. Lee of East Orange and the late Dr. Stephen G. Lee, Sr. A graduate of East Orange High School and Wesleyan University, he attended Harvard University Dental School and was graduated from McGill University Dental School in 1933. He did graduate work at Columbia University in 1941.

Dr. Lee had lived in Short Hills the past fifteen years. He practiced in East Orange until 1952, when he moved his practice to Short Hills.

Popularly known in New Jersey golfing circles as Jerry, Dr. Lee was president of the New Jersey State Golf Association in 1946 and 1947. He was on the Association's Executive Committee in 1939 and 1944 and was vice-president of the Association in 1945. While he was president of the Association he was instrumental in establishing the Association's Caddie Scholarship Fund. This fund was the second such fund organized by any golf association in this country. The fund now pays part of the expenses at Rutgers University for five boys each year. Dr. Lee had been a semifinalist in the N.J.S.G.A. Amateur Championship in 1933 and was a member of Essex Fells, Canoe Brook, and Baltusrol. He also was badminton champion of New Jersey in 1938 and 1939.

He was a member of the American, New Jersey, and Essex County Dental Associations and of the American Dental Association. He was also a member of the American Association of Orthodontists and the Middle Atlantic and Northeastern Societies of Orthodontists.

He is survived by his widow, Mrs. Pauline Seavey Lee, a son, Anthony D., and a daughter, Judith Ann, all at home. His mother and his sister, Mrs. Arlene Mitchell, also survive.

BE IT RESOLVED that these resolutions be made a part of our records and that an appropriate message of sympathy be sent to Mrs. Lee and her family.

John H. Madden
Medical Arts Bldg.
Staten Island, New York

Harry Elias Abelson
1886-1957

THE members of the Northeastern Society of Orthodontists will learn with deep regret of the death of Dr. Harry Elias Abelson on Aug. 26, 1957.

Dr. Abelson was born on March 11, 1886. He was graduated from the New York College of Dentistry in 1913 and was associated with Martin Dewey from 1913 to 1925. He conducted the Dewey School with Dr. Moss from 1932 to 1955. He was a member of the American Association of Orthodontists, the Northeastern Society of Orthodontists, the American Dental Association, the New York State Dental Association, and the First District Dental Society. He was a member of the Masons and a charter member of the Alpha Omega fraternity.

Dr. Abelson is survived by his wife, Lena Swinton Abelson; a daughter, Victoria; a son, Dr. Swinton Abelson; and three grandchildren. He retired from active practice in 1955 and lived in Peekskill.

BE IT RESOLVED that this Society place these resolutions on record and that an appropriate message of sympathy be sent to Mrs. Abelson and her family.

John H. Madden
Medical Arts Bldg.
Staten Island, New York

J. Mark Trach
1905-1957

J. MARK TRACH, of Wheeling, West Virginia, died on April 20, 1957.

Dr. Trach was born on Aug. 17, 1905, at Farmington, West Virginia, a son of the late Dr. J. M. Trach and Eva Kunkle Trach.

He attended Gettysburg College and West Virginia University, where he studied engineering, which he followed for seven years. He returned to school at Ohio State University and was graduated from the Dental School there in 1940. He specialized in orthodontics at Eastman Clinic in Rochester, New York. He opened his office in Wheeling in January, 1942. Dr. Trach took postgraduate work in Philadelphia and also under Oren Oliver at Washington University in St. Louis.

Dr. Trach was a member of the Lutheran Church and of the Masonic Order. He held membership in the West Virginia State Dental Society, the American Dental Association, the American Association of Orthodontists, and the Southern Society of Orthodontists. He was secretary of the Wheeling District Dental Society for three years and a member of the committee for establishing the dental school at West Virginia University. The medical buildings there are under construction at the present time.

He is survived by his wife, Ethel King Trach, whom he married in 1928; a daughter, Sarah Trach; his mother, Mrs. Eva Trach, Fairmont, West Virginia; a brother, Dr. John P. Trach, Fairmont, West Virginia; and a sister, Mrs. H. R. Smith of Colorado Springs, Colorado.

Arthur Max Schutzman
1894-1956

ARTHUR MAX SCHUTZMAN, of Baton Rouge, Louisiana, died of a heart attack on the evening of Dec. 13, 1956.

Dr. Schutzman was a native of East Baton Rouge parish. He was graduated from Baton Rouge High School, attended Louisiana State University, and was graduated from the Atlanta Southern Dental College in 1919. After practicing dentistry in Baton Rouge for a few years, he attended and received his certificate from the Dewey School of Orthodontia in New York City in 1925.

Dr. Schutzman was a member of the Catholic Church, the American Legion, and the Kiwanis Club. He held memberships in the Louisiana State Dental Society, the American Dental Association, the American Association of Orothodontists and the Southern Society of Orthodontists. Dr. Schutzman was the author of a book on orthodontics published in 1934.

He is survived by his wife, Carrie Mary Danos; two sons, Robert S. Schutzman of Baton Rouge and Arthur M. Schutzman, Jr., of New York City; one daughter, Mrs. Tom Van der Zwet of Baton Rouge; one sister, Mrs. Malcolm Upton of Baton Rouge; and three grandchildren.

Department of Orthodontic Abstracts and Reviews

Edited by

Dr. J. A. Salzmann, New York City

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

Bilateral Asymmetry in Skeletal Maturation of the Hand and Wrist: A Roentgenographic Analysis. By Melvyn J. Baer and Josephine Durkatz. *Am. J. Phys. Anthropol.* **15**: 181-196, 1957.

The bilateral differences in maturational status of each of the carpal bones and of the bony epiphyses were determined through comparisons of radiographs of the right and left hands of the same persons. The developmental status of each center of ossification was assessed in terms of the maturational stages described by Greulich and Pyle. An asymmetry was found to exist when the osseous units representing the same bone were assigned to different stages in each hand.

The present investigation attempted to answer the following questions:

1. What is the frequency of occurrence of maturational asymmetries in the carpal bones and epiphyses of the hand and wrist?

2. How does the variability in time of onset of ossification reported in the literature for the carpal bones and epiphyses of the left hand compare with the frequency of bilateral asymmetries in the same bones? In other words, are those bones which are most variable in time of appearance in the left hand also the most likely to show bilateral asymmetry?

3. Is there a sex difference in the incidence of maturational asymmetries?

4. Does skeletal maturation advance more rapidly in one hand than in the other?

The data used comprise a series of 474 roentgenograms of both hands and wrists taken on a population of 123 boys and 122 girls. The subjects were enrolled in the Infant Service, Nursery School, or Clubs Service of the Merrill-Palmer School in the years 1929-1933 and 1950-1955. Of the total of 245 children, 239 were Caucasians, 5 were Negroes, and 1 was Mongolian. The method used to assess the maturity of the individual bones was based on the definitions of maturational stages described and illustrated by Greulich and Pyle in 1950. Only the first three stages defined by these writers were employed. In order to record the unilateral presence of a bone, a stage "0" was established to denote the absence of a center of ossification. A general description characterizing each of the first three stages of maturity is as follows:

Stage I is characterized by the initial appearance of the center of ossification.

Stage II is attained when the bone nodule is rounded and its margins are smooth (in the case of the carpal bones and the epiphyses

of the metacarpals) or when the epiphyses is disk-shaped and its margins are smooth (in the case of the phalanges).

Stage III is reached when the articular surfaces begin to differentiate (carpal bones), when the epiphysis begins to flatten to conform to the shape of its diaphysis (metacarpals), when the central portion of the growth cartilage plate attains its definitive thickness (metacarpals and phalanges), or when the epiphysis is half as wide as the diaphysis (phalanges).

Films of the right and left hands of each child were read at the same time. All the roentgenograms were assessed by one reader who had had no previous experience in assessing hand films by the more frequently used method of determining skeletal age. Fifty roentgenograms, selected at random, were reassessed by the observer after a lapse of several weeks.

The findings concerning the foci of greatest asymmetry parallel Pyle and Sontag's conclusion that the carpal bones tend to show greater variability in onset of ossification than the epiphyses of the long bones of the hand.

In order to determine the degree of relationship between the three variables—(1) order of appearance of centers of ossification, (2) variability of onset of ossification as expressed by the standard deviation, and (3) percentage of bilateral asymmetry—Spearman rank order correlation coefficients were calculated.

The mean percentages of asymmetry of the fifteen bones for which data are available for both sexes are 32.63 per cent for boys and 30.21 per cent for girls. A test of the significance of the difference for matched groups indicates that there is no significant sex difference in total percentage of asymmetry during the first three stages of skeletal maturation of the hand and wrist. The rank order correlation coefficient further demonstrates great comparability in the relative degree of asymmetry of the individual bones in boys and girls.

In this study, 286 instances of bilateral asymmetry were observed in the male series and 207 in the female series. For the boys, the right hand was found to be more advanced 147 times and the left 139 times; for the girls, the right hand was more advanced in 96 instances and the left in 111 instances. Application of a T test for matched groups indicates that in neither sex is one hand significantly advanced maturationally over the other. The rank order correlation coefficients indicate that the same bones are involved when either the right or the left hand is maturationally more advanced.

The data presented show that neither hand was found to be significantly advanced in development over the other. In general, the most advanced center of a pair of asymmetrical bones may appear in either hand, since the centers of ossification do not exhibit different bilateral trends. Second, bilateral asymmetry shows a positive relationship to the order of appearance and the variability in onset of ossification and a great degree of bilateral asymmetry, in contrast to the markedly lesser degree of variability and bilateral asymmetry taking place in the epiphyses of the hand. These findings suggest that the degree of bilateral asymmetry which does occur in a population of normal children is a result of the variability in the time of initiation of the ossification process. Accordingly, bilateral asymmetry, at least during the early stages of maturation, does not appear to be a separate phenomenon requiring separate treatment.

The conclusion that bilateral asymmetry is an extension of the variability in rate of maturation of the bones within one hand emphasizes the importance, for clinical application, of further investigation of the factors influencing

variation in ossification. The present standards provide a basis for determining whether a child is progressing rapidly or slowly or is approximating the average of the population in general rate of skeletal maturation. However, given a roentgenogram in which the individual bones show a wide spread of skeletal ages, or in which the appearance of missing centers is long overdue, the clinician is confronted with alternative interpretations concerning the cause and significance of the developmental inconsistency. Todd, Francis and Werle, Francis, Pyle and associates, and Mann and associates have stressed the importance of metabolic disturbances, disease, and chronic nutritional deficiency in producing maturational asymmetry. On the other hand, Pryor, Sontag and Lipford, Robinow, and Garn, among others, have emphasized the role of hereditary variation in creating diverse ossification patterns. Although the latter interpretation does not eliminate the former as a factor, it brings into serious question the status of each of these factors as sole determinants.

The problem facing the clinician, then, is to distinguish between hereditary variation and pathologic aberration in the absence of specific diagnostic criteria. The present writers have encountered, in the Merrill-Palmer Longitudinal Series, instances of delayed appearance of ossification centers and sufficiently slow maturation of others to warrant an assumption of systemic disturbance were it not for the fact that the same pattern in considerable detail appeared in a sibling several years later.

The alternative interpretations concerning the meaning of developmental skeletal asymmetries do not, in themselves, afford criteria of discrimination. The need for such criteria to complement the use of present standards of skeletal maturation suggests that more research might be profitably directed toward a determination of the mechanisms controlling the processes of ossification at the histologic level. Several studies have shown, for example, that there is greater variability in the time of onset of ossification in the carpal bones than in the epiphyses. What is now needed is an explanation of the anatomic factors responsible for this occurrence.

FINDINGS

1. In both sexes the carpal bones, taken as a group, show a considerably higher average percentage of asymmetry than the average for the epiphyses.

2. Frequency of bilateral asymmetry in the individual bones correlates significantly and equally well with the order of appearance of the centers of ossification and with the standard deviations for onset of ossification of the individual bones.

3. There is no significant sex difference in total percentage of asymmetry during the first three stages of skeletal maturation of the hand and wrist.

4. There is great comparability in the relative degree of asymmetry of the individual bones in boys and girls.

5. For both sexes, considering the total occurrence of asymmetries, neither hand was found to be significantly advanced maturationally over the other.

6. In those instances in which either the right or the left hand is advanced maturationally, the same bones are involved; in other words, specific centers of ossification do not exhibit different bilateral trends.

7. The conclusion is drawn that the degree of bilateral asymmetry which does occur in a population of normal children is a function of the variability in the initiation time of the ossification process.

News and Notes

Attention All Active Members of the American Association of Orthodontists

The secretary of your component society has been supplied with copies of the amended Constitution and By-Laws. Any member may obtain a copy by writing to him.

Earl E. Shepard, Secretary-Treasurer
American Association of Orthodontists

American Board of Orthodontics

The next meeting of the American Board of Orthodontics will be held at the Statler Hotel in Detroit, Michigan, April 28 through May 2, 1959. Orthodontists who desire to be certified by the Board may obtain application blanks from the Secretary, Dr. Wendell L. Wylie, University of California School of Dentistry, The Medical Center, San Francisco 22, California.

Applications for acceptance at the Detroit meeting, leading to stipulation of examination requirements for the following year, must be filed before March 1, 1959. To be eligible, an applicant must have been an *active* member of the American Association of Orthodontists for at least two years.

Middle Atlantic Society of Orthodontists

The seventh annual meeting of the Middle Atlantic Society of Orthodontists will be held at Haddon Hall, Atlantic City, New Jersey, Oct. 12 to 14, 1958. Reservations may be made by writing directly to the hotel.

Northeastern Society of Orthodontists

The next meeting of the Northeastern Society of Orthodontists will be held Nov. 3 and 4, 1958, at the Queen Elizabeth Hotel in Montreal, Quebec.

The newly elected officers of the Northeastern Society are as follows:

President: Walter R. Bedell
President-Elect: Wilbur J. Prezzano
Vice-President: Henry C. Beebe
Secretary-Treasurer: David Mossberg
Sectional Editor: Joseph D. Eby
Assistant Editor: Brainerd F. Swain
Historian: Leuman M. Waugh
Director: Norman L. Hillyer
Alternate: Richard Lowy

Rocky Mountain Society of Orthodontists

President George Ewan announces that the Rocky Mountain Society of Orthodontists will hold its 1958 meeting September 7 to 10 at Jackson Lake Lodge in the heart of the Teton Mountains. This spot is located just south of the famed Yellowstone National Park, and it is thought that holding the meeting at this location will afford many an opportunity to "kill two birds with one stone"—attend the Rocky Mountain Society Meeting and visit one of the most beautiful and colorful spots in America, all at one and the same time.

From two paragraphs from the Rocky Mountain president's message to members, we read:

"Yellowstone Park is the 'granddaddy' of all national parks. It abounds in geysers, boiling mud-pots, colorful canyons, waterfalls, wild game, etc.

"Anyone planning to approach or leave Yellowstone Park from the East will find the Indian Medicine Wheel on Wyoming 14 between Lovell and Sheridan in the Big Horn Mountains. The Medicine Wheel marks an Indian ceremonial area of unknown origin and significance. This is not a good road, and you should not plan to make fast driving time. Please let me know if you plan to come this way so that we may plan a snack together in this area."

Southern Society of Orthodontists

The thirty-seventh annual meeting of the Southern Society of Orthodontists will be held aboard the luxury cruise ship "M. V. Arosa Sky."

The ship will leave Norfolk, Virginia, on Sunday, Oct. 19, 1958, for Bermuda, W. I. It will return from Bermuda, docking at Norfolk, Virginia, on Friday, October 24.

American Association for Cleft Palate Rehabilitation

The American Association for Cleft Palate Rehabilitation will hold its seventeenth annual convention at the Sheraton Hotel in Philadelphia on Thursday, Friday, and Saturday, April 30 through May 2, 1959.

This Association is composed of medical, dental, and paramedical specialists who are interested in the rehabilitation of persons with cleft lips and palates.

Odontological Federation of Central America-Panama

The second international convention of the Odontological Federation of Central America-Panama will be held in San José, Costa Rica, in the Building of Basic Sciences, University of Costa Rica, Nov. 25 to 29, 1958.

Honorary Degrees Conferred on A.D.A. Officials

According to a recent American Dental Association newsletter, honorary doctor of science degrees have been conferred on the following dentists:

Dr. William R. Alstadt, orthodontist, of Little Rock, Arkansas, A.D.A. president, was awarded the honorary doctor of science degree on June 1 at commencement exercises at the University of Kansas City. The degree, the first of its kind conferred in the twenty-nine-year history of the school, was presented by Chancellor Richard M. Drake of the university. Earlier in the spring, during a trip to the Far East, Dr. Alstadt was the recipient of two honorary degrees of doctor of dental surgery, both awarded at ceremonies in Tokyo. One was conferred by Nihon University School of Dentistry and the other by Tokyo Dental College.

Dr. Harold Hillenbrand, of Chicago, A.D.A. secretary, was presented with an honorary doctor of science degree from Loyola University in Chicago at the school's commencement exercises on June 11. Dr. Hillenbrand gave the commencement address.

Dr. Frederick S. McKay, orthodontist of Colorado Springs, whose pioneer studies in Colorado early in the century paved the way for the fluoridation procedure, was awarded a doctor of science degree from Colorado College in Colorado Springs on June 2. In 1951, the A.D.A. House of Delegates unanimously voted honorary membership to Dr. McKay.

Necrology Committee
American Association of Orthodontists

The chairman of the Necrology Committee of the American Association of Orthodontists is Dr. Ernest Bach, 305 Professional Bldg., Toledo, Ohio.

Dr. Bach has asked the secretaries of all component societies to notify him of the passing of any of their members.

He asks for obituaries or resolutions that are adopted by the societies. The date and place of birth and the date and place of death of the deceased should be included.

U. S. Department of Health, Education, and Welfare

Dr. Katherine Bain has been appointed Deputy Chief of the Children's Bureau, U. S. Department of Health, Education, and Welfare, according to a recent announcement by Mrs. Katherine B. Oettinger, Bureau Chief.

Dr. Bain, a long-time member of the Children's Bureau staff and a former practicing pediatrician, succeeds Mrs. Elizabeth Healy Ross, who resigned last November.

Notes of Interest

Robert J. Fanning, D.D.S., announces that his practice is now limited to orthodontics, 708 Coppin Bldg., Covington, Kentucky.

Scott T. Holmes, D.D.S., M.S., announces the association of David W. Hogan, D.D.S., M.S., in the practice of orthodontics at 1205 Peck St., Muskegon, Michigan.

Allen E. Hom, D.D.S., announces the removal of his office to 10642 Downey Ave., Downey, California, practice limited to orthodontics.

Sherrill Jennings, D.D.S., M.S.D., announces the opening of his office for the practice of orthodontics at 204 East Jackson, Pasadena, Texas.

David J. McKenna, D.D.S., announces the opening of his offices at 297 Farmington Ave., Hartford, Connecticut, practice limited to orthodontics.

Forthcoming meetings of the American Association of Orthodontists:
1959—Statler Hotel, Detroit, Michigan, May 4 to 7.
1960—Shoreham Hotel, Washington, D. C., April 24 to 28.
1961—Denver, Colorado.
1962—Los Angeles, California.

OFFICERS OF ORTHODONTIC SOCIETIES

The AMERICAN JOURNAL OF ORTHODONTICS is the official publication of the American Association of Orthodontists and its component societies. The Editorial Board of the JOURNAL is composed of a representative of each of the component societies.

American Association of Orthodontists
(Next meeting May 4-7, 1959, Detroit)

President, C. Edward Martinek - - - - - - - - - - Fisher Bldg., Detroit, Mich.
President-Elect, George M. Anderson - - - - - - 3700 N. Charles St., Baltimore, Md.
Vice-President, Ernest N. Bach - - - - - - - - - Professional Bldg., Toledo, Ohio
Secretary, Earl E. Shepard - - - - - - - - - - - - 8230 Forsyth, St. Louis, Mo.

Central Section of the American Association of Orthodontists
(Next meeting Sept. 29-30, 1958, Cedar Rapids)

President, Frederick B. Lehman - 1107 Merchants National Bank Bldg., Cedar Rapids, Iowa
Secretary-Treasurer, William F. Ford - - - - - - - 575 Lincoln Ave., Winnetka, Ill.
Director, Elmer F. Bay - - - - - - - - - - - 216 Medical Arts Bldg., Omaha, Neb.

Great Lakes Society of Orthodontists
(Next meeting Nov. 2-5, 1958, Pittsburgh)

President, Edwin G. Flint - - - - - - - - - - 8047 Jenkins Arcade, Pittsburgh, Pa.
Treasurer, D. C. Miller - - - - - - - - - - - - 40 South Third St., Columbus, Ohio
Director, Robert E. Wade - - - - - - - - - - - - 327 E. State St., Columbus, Ohio

Middle Atlantic Society of Orthodontists
(Next meeting Oct. 12-14, 1958, Atlantic City)

President, Gerard A. Devlin - - - - - - - - - - - 121 Prospect St., Westfield, N. J.
Secretary-Treasurer, Paul A. Deems - - - - - - - - - 835 Park Ave., Baltimore, Md.
Director, George M. Anderson - - - - - - - - 3700 North Charles St., Baltimore, Md.

Northeastern Society of Orthodontists
(Next meeting Nov. 3-4, 1958, Montreal)

President, Walter R. Bedell - - - - - - - - - 49 Market St., Poughkeepsie, N. Y.
Secretary-Treasurer, David Mossberg - - - - - 36 Central Park S., New York, N. Y.
Director, Norman L. Hillyer - - - - - - - - 230 Hilton Ave., Hempstead, L. I., N. Y.

Pacific Coast Society of Orthodontists

President, Richard Railsback - - - - - - - - - - 1333 Grand Ave., Piedmont, Calif.
Secretary-Treasurer, Warren Kitchen - - - - - - 2037 Irving St., San Francisco, Calif.
Director, Richard Railsback - - - - - - - - - - - 1333 Grand Ave., Piedmont, Calif.

Rocky Mountain Society of Orthodontists
(Next meeting Sept. 7-9, 1958, Moran, Wyo.)

President, George E. Ewan - - - - - - - - Bank of Commerce Bldg., Sheridan, Wyo.
Secretary-Treasurer, H. Carlyle Pollock, Jr. - - - 915 South Colorado Blvd., Denver, Colo.
Director, Ernest T. Klein - - - - - - - - - - - - - Republic Bldg., Denver, Colo.

Southern Society of Orthodontists

President, John A. Atkinson - - - - - - - - - - - 898 Starks Bldg., Louisville, Ky.
Secretary-Treasurer, H. K. Terry - - - - - - - - - 2742 Biscayne Blvd., Miami, Fla.
Director, Edgar Baker - - - - - - - - - - - - - Professional Bldg., Raleigh, N. C.

Southwestern Society of Orthodontists
(Next meeting Oct. 5-8, 1958, Little Rock)

President, Thermon B. Smith - - - - - - - - - - 1122 W. Capitol, Little Rock, Ark.
Secretary-Treasurer, Harold S. Born - - - - - - - 908 S. Johnstone, Bartlesville, Okla.
Director, Nathan Gaston - - - - - - - - - - - - - 701 Walnut St, Monroe, La.

American Board of Orthodontics

President, William R. Humphrey - - - - - - - - 1232 Republic Bldg., Denver, Colo.
Vice-President, L. Bodine Higley - - - University of North Carolina, Chapel Hill, N. C.
Secretary, Wendell L. Wylie - - - - - - University of California School of Dentistry,
The Medical Center, San Francisco, Calif.
Treasurer, Jacob A. Salzmann - - - - - - - - - - 654 Madison Ave., New York, N. Y.
Director, B. F. Dewel - - - - - - - - - - - - - - - 708 Church St., Evanston, Ill.
Director, Frank P. Bowyer - - - - - - - - - 608 Medical Arts Bldg., Knoxville, Tenn.
Director, Paul V. Reid - - - - - - - - - 1501 Medical Arts Bldg., Philadelphia, Pa.

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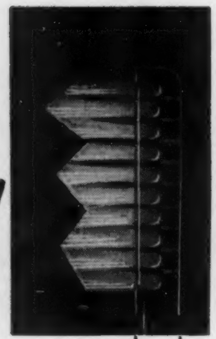
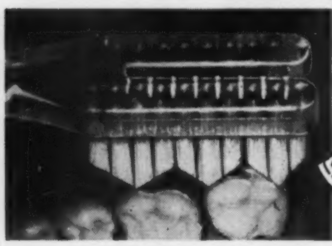
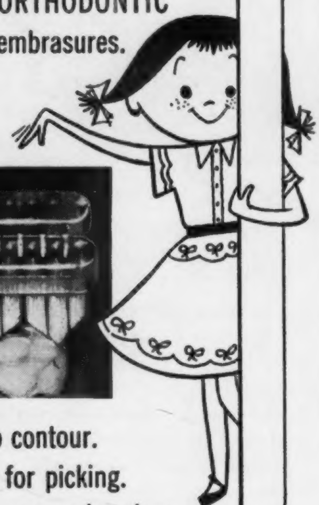
"Shorty"

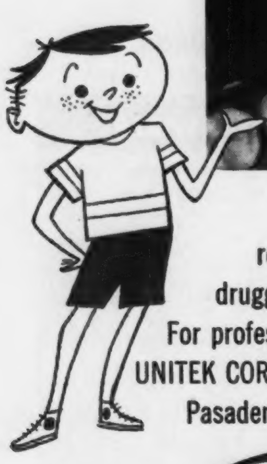


A new, short bristle,
contour-trim ORTHODONTIC
brush spaced for embrasures.
Clears wires.





Adapted to contour.
Long end-tuft for picking.
Reaches second molars.
Children like "shorty".



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